

THEOPHRASTUS

His Psychological, Doxographical,
and Scientific Writings

Edited by
William W. Fortenbaugh
and
Dimitri Gutas

RUTGERS UNIVERSITY STUDIES IN CLASSICAL HUMANITIES Volume V

THEOPHRASTUS

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Contents

Preface	ix
Contributors	xi
1. Peripatetic Dialectic in the <i>De sensibus</i> <i>Han Baltussen</i>	1-19
2. Empedocles' Theory of Vision and Theophrastus' <i>De sensibus</i> <i>David N. Sedley</i>	20-31
3. Theophrastus on the Intellect <i>Daniel Devereux</i>	32-43
4. Theophrastus and Aristotle on Animal Intelligence <i>Eve Browning Cole</i>	44-62
5. <i>Physikai doxai</i> and <i>Problēmata physika</i> from Aristotle to Aëtius (and Beyond) <i>Jaap Mansfeld</i>	63-111
6. Xenophanes or Theophrastus? An Aëtian <i>Doxographicum</i> on the Sun <i>David Runia</i>	112-140
7. 'Place' in Context: On Theophrastus Fr. 21 and 22 Wimmer <i>Keimpe Algra</i>	141-165
8. The <i>Meteorology</i> of Theophrastus in Syriac and Arabic Translation <i>Hans Daiber</i>	166-293
9. Theophrastus' <i>Meteorology</i> , Aristotle and Posidonius <i>Ian G. Kidd</i>	294-306
10. The Authorship and Sources of the <i>Peri sēmeiōn</i> Ascribed to Theophrastus <i>Patrick Cronin</i>	307-345
11. Theophrastus: <i>On Fish</i> <i>Robert W. Sharples</i>	347-385
Index of Ancient Sources	386-410



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Preface

The town of Eresos lies on the southern shore of the western leg of the lambda that is Lesbos. It is the birthplace of the Peripatetic philosopher Theophrastus and therefore an obvious place for Project Theophrastus to hold one of its biennial conferences. On the first three days of August 1989 the obvious became reality; a conference sponsored by the Project took place at Eresos.

The modern village has a modest population of about six hundred inhabitants, with several hundred more sons and daughters of Eresos scattered throughout the world. There is, however, nothing modest about the self-consciousness of the Eresians, both those on the island and the emigrants abroad. History weighs robustly on them, for they know that their town is the birthplace of both Sappho and Theophrastus. A lesser folk might have refused the request to host a Project conference. Not so the modern Eresians, who enthusiastically took up the challenge of organizing a conference on their most famous son.

Dr. George Andreou, δήμαρχος Ἐρεσοῦ, chaired an organizing committee that consisted of Ignatios Papazoglou, Sotiris Kardaras, Loukas Kovras, George Loukidis, Ilias Sahlos, Antonis Tsalavoutis, Miltiadis Lambrinidis and Mary Kazazi. The committee, ably aided by other Eresians, raised the necessary funds, looked after every imaginable detail and put together a conference, complete with excursions, receptions, and commemorative medallions crafted by Haralambos Repanellis. Even in providing a meeting place the Eresians achieved perfection. They selected a theater hall immediately next door to a magnificent neo-classical building—the elementary school which is appropriately called the Θεοφράστειον. The hall itself was attractively decorated, not the least by a portrait of Theophrastus that had been painted for the occasion by Ioakim Lambrinidis.

Availing themselves of the opportunity, the Eresians honored not only the conference participants but themselves as well. Through the generosity of Viktoria and Sokratis Sahlos, a bust of Theophrastus was sculpted by the artist Th. Papagiannis, and was unveiled in the main square of Skala Eresou after a fitting ceremony on the opening day of the conference. We like to think that Theophrastus, who obviously was never absent from the hearts and minds of the Eresians, has

now physically returned home. As a small token of our appreciation we dedicate this volume τοῖς ἀπανταχοῦ Ἑρεσίοις.

The papers contained in this volume were in their first draft all written for the conference in Eresos. With one exception they were read there and commented on by the conference participants. As actually printed the papers have undergone various degrees of revision, often taking advantage of criticisms and suggestions made during informal discussion in Eresos. Two of the papers are unusual in that they contain editions together with translation and commentary of Theophrastean treatises. With these editions/translations as with all the papers collected in the volume, we have tried to be helpful editors, not imposing our own views but encouraging clarity and seeking a measure of uniformity in format.

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Peripatetic Dialectic in the *De sensibus*

Han Baltussen

INTRODUCTION

The *De sensibus*¹, traditionally attributed to Theophrastus and printed by Hermann Diels² as a fragment of the lost (so-called) *Physikōn doxai*, is interesting in itself for two reasons: first, it contains unique and extensive information on the views of the Presocratics concerning sense perception; second, the structure and argument it exhibits are in many respects noteworthy and intriguing. Needless to say, the first aspect received considerable attention in the scholarly literature on the Presocratics. The structure and nature of Theophrastus' presentation and polemical argumentation as a whole, however, have not yet been the subject of a detailed scholarly investigation.³

There are also extrinsic reasons to investigate this important fragment. On the one hand, there has been considerable progress in understanding the argumentative approach of Aristotle's 'historical overviews'. It has been shown that many of

¹ I use the plural in the title for two reasons: to distinguish the work from Aristotle's *De sensu* and because the best MSS (P = Parisinus 1921, s. XIV and F = Laurentianus LXXXVII 20) have the plural (note that this would fit the title *περὶ αἰσθήσεων α'* preserved in D.L. V.42. See further Diels, *Doxographi Graeci*, Berolini/G. Reimer, 1879, pp. 114 ff.)

² In his *Doxographi Graeci* (supra, n. 1) pp. 499-527.

³ It should be acknowledged that Beare's work (*Greek Theories of Elementary Cognition from Alcmeon to Aristotle*, Oxford 1906, repr. Dubuque [1965?]) and Stratton's introduction and notes (*Theophrastus and the Greek Physiological Psychology before Aristotle*, London 1917; repr. Hakkert, Amsterdam 1964), esp. on Plato, are to some extent exceptions. But Beare indiscriminately draws from different sources (e.g. Aëtius) to establish a picture of the theories on sense perception. Stratton's 'empirical' approach prevented him from appealing to a wider perspective of Peripatetic methodology. Furthermore, his translation of certain technical terms pertaining to method and criticism is, I believe, inconsistent and therefore in need of correction. In later studies remarks concerning method in the *De sensibus* are made in passing, mostly within the frame-work of an enquiry into the *content* of Presocratic thought.

2 Theophrastus

the introductory discussions of earlier thinkers are dialectical, esp. in the light of what has been called ‘the mandate in *Top.* I.2’. When we use the term ‘dialectical’ in this connection, it stands not only for an approach that is ‘polemical’ or ‘critical’ (i.e. destructive), but also for one that is constructive by making a preliminary inquiry into *archai* or basic principles. Linking up with these recent investigations it seems only natural to compare the approach in these overviews with that of the *De sensibus*. I shall discuss this in a moment, referring to it as the ‘methodological problem’.

On the other hand, we are facing a problem with regard to the status of the *De sensibus*; I call this the ‘doxographic problem’. As stated in the opening sentence, Diels regarded the fragment as part of a lost work, which according to him and Usener bore the title *Physikōn doxai*.⁴ This view, already questioned by Stratton and Regenbogen⁵, has recently come under attack by Steinmetz⁶ who argued persuasively that Diels’s reconstruction of the *Physikōn doxai* is untenable with regard to most of the fragments derived from Simplicius’ commentary on Aristotle’s *Physics*. As this issue is closely connected with that of the *De sensibus* (Diels and Usener used an argument from analogy between our text and the Simplicius fragments to prove their identical origin) a new investigation would appear justified. In order to keep other options open it seems an interesting working hypothesis, at least for the sake of the argument, to consider the possibility that the *De sensibus* was part of a systematical work on sense perception (a separate work or part of the *Physics*) with an introduction that arranges, excerpts and discusses all the historical material thought to be relevant.

In this paper I intend to show that a new and fruitful approach towards the ‘doxographic problem’ is possible *after* dealing with the ‘methodological’ one. It seems that the dialectical procedure which Aristotle used in many of his treatises and sketched in his *Topics* can provide an interesting link between methodology and ‘doxographic’ material and will clarify certain aspects of the relationship between refutation and inquiry.

⁴ On their arbitrary interpretation of this title see, for instance, D. Gutas, (review of H. Daiber’s *Aetius Arabus*) *Journal of the Royal Asiatic Society* (1982), p. 113 and note 2, and J. Mansfeld, ‘Doxography and Dialectic: The *Sitz im Leben* of the *Placita*’, *ANRW* II 36.4, (1990) n. 1. As to the terms ‘doxography/doxographic’, I shall use inverted commas, because it was coined by Diels to refer to post-Theophrastean collections of opinions arranged according to specific subjects; see also below, n. 72.

⁵ Stratton in his introduction (p. 54, n. 7) formulated a slight doubt as to the “judgement ... which takes our present *Περὶ αἰσθησέων* to be but a fragment of the work in many books, *Περὶ φυσικῶν δοξῶν*”, and also took into account the possibility that it was originally a work in one book the title of which is preserved in Diogenes Laertius V. 42; cf. *supra* n. 1. Regenbogen, *RE*, Suppl. vii, 1399 f., expressed a stronger view about the positive goal the criticism must have had: “Mir scheint fast unumgänglich, in der Doxographie und Kritik des Fragments eine Vorbereitung eigener Lehre zu sehen”, which was echoed by P. Steinmetz, *Die Physik des Theophrastos von Eresos*, Bad Homburg 1964, p. 338.

⁶ *op.cit.* (previous note), pp. 335 ff.

I. PERIPATETIC DIALECTIC REVISITED

Once attention is directed towards Theophrastus' argumentation, the choice of Peripatetic dialectic as a normative model (or heuristic device), being a general theory of argumentation, seems obvious. But there are more specific reasons. Since the fundamental study of E. Weil⁷ the picture of the function and content of the dialectical method has undergone considerable adjustment. Dialectic was rehabilitated against the dominant role of analytics and freed from sophistic qualifications which were undeservedly attached to it.⁸ This caused a new interest in the *Topics*, the treatise in which Aristotle expounded his theory of dialectical reasoning.

Although today no overall agreement exists upon details of interpretation, it is still possible to summarize the main elements of the results so far.⁹ I have attempted to incorporate the various results into one description which will enable us to gain a new understanding of the dialectical procedure. I shall first focus on the goal of dialectic, passing on to its more specific function in 'doxographic' contexts. It may seem a small detour at the moment, but I hope it will prove to be a *reculer pour mieux sauter*.

The introduction to the *Topics* states the goal, functions and means of the dialectical method. It is a remarkably lucid and fundamental declaration of the

⁷ E. Weil, 'La place de la logique dans la pensée aristotélicienne', *RMM* 56 (1951), 283-315 [= 'The Place of Logic in Aristotle's Thought', repr. in J. Barnes *et al.* (edd.), *Articles on Aristotle, I. Science* (London, Duckworth 1975), pp. 88-112]. I shall quote from the English translation. An earlier instance of a study that investigated the role of the search for principles in Aristotle's *Physics* is J.M. LeBlond, *Logique et Méthode chez Aristote*, Paris 1939. But the earliest (and least quoted) instance is H.D.P. Lee, 'Geometrical method and Aristotle's account of first principles', *CJQ*, 29 (1935), 113-24. The most recent contributions on the subject are by T.H. Irwin, *Aristotle's First Principles* (Oxford, Clarendon Press 1988) and A. Beriger, *Die aristotelische Dialektik. Ihre Darstellung in der 'Topik' und in den 'Sophistischen Widerlegungen' und ihre Anwendung in der 'Metaphysik' M 1-3* (Heidelberg / Carl Winter 1989).

⁸ As Weil (*op. cit.* p. 89) summarized it: "... both [analytics and dialectic] are equally formal, both apply a method that is independent of the content, both use the syllogism as their principal tool".

⁹ For reasons of economy, references to earlier articles and studies devoted to dialectic, which I have used for this reconstruction, are selective. Recent studies are too often unaware of earlier results in the same field (e.g. as indicated in n. 7), and frequently duplicate previous work. The line of argument I shall follow is based upon the studies of Weil (cited n. 7); E. Braun, *Zur Einheit der Aristotelischen Topik* (diss. Köln 1959); J. Barnes, 'Aristotle's Theory of Demonstration', in: J. Barnes *et al.* (edd.), *Articles on Aristotle, op. cit.* (note 7), pp. 65-87; J.D.G. Evans *Aristotle's Concept of Dialectic*, (Cambridge U.P. 1977); K. Schickert, *Die Form der Widerlegung beim frühen Aristoteles* (München 1977); M. Galston, (next note); Morsink, 'The Mandate of the *Topics*', *Apeiron* 16 (1982), 102-28, which all aim at 'upgrading' dialectic as a scientifically useful procedure.

4 Theophrastus

usefulness and effects of the procedure, worthy of Aristotle's didactical qualities. He maintains that the real function of the method is threefold.

First, it gives a *training* procedure for arguing *pro* and *contra* a thesis. But closer reading makes it clear that this is not to be understood as a discussion in the normal sense of the word. The roles of the participants are strictly defined and differ from an ordinary debate in that (a) the 'attacker' tries to make the answerer give in to his questions in order to reach the position he tries to uphold and that (b) the answerer must judge these questions while considering their power to refute his own position. This produces a situation similar to that of a chess game in which many of the moves are known, but where the possibility to win still exists.

But winning was not the ultimate goal of dialectical training. The best discussion of the real goal is the fairly recent study by M. Galston.¹⁰ Her analysis, building upon the work of Weil and Barnes, brings out the *intrinsic effect* of the dialectical training and supports the usefulness of dialectic for philosophical research. She distinguishes between an 'argumentative' and an 'investigative' aspect of the method. A good understanding of the first, that is the actual process of arguing (training), will lead to the justification of the second (effect of the training). The roles of the participants in the debate as described above made it clear that their task is, on the one hand, to present questions that will evoke answers leading to a logical and unavoidable conclusion, *viz.* the result aimed at, and on the other hand, to judge these questions as to their refutative character with regard to one's own position (*i.e.* the conclusion). Consequently, the debaters acquire "... a mental habit of discerning the necessary connections between propositions and are therefore mainly concerned with *logical consistency*" (italics mine).¹¹ In other words, the real goal of the *Topics* is to gain insight into "refutation and avoiding refutation".¹² This explanation squares extremely well with the opening sentence of the *Topics* in which Aristotle gives the aim of the treatise in general terms:

¹⁰ 'Aristotle's Dialectic, Refutation, and Inquiry', *Dialogue* 21 (1982), 79-93.

¹¹ We find the same emphasis on the psychological effect already in Alexander Aphr. *In Top.* (Wallies), p. 27, 23-31. That previous investigations did not pay sufficient attention to this effect was mainly due to the fact that they interpreted the method primarily on the basis of the *description of the training* in *Top.* II-VII. But there is of course a considerable difference between didactical means and the final result aimed at. The real problem is that Aristotle did not clarify the relationship between the prescriptions of his topics and the claim (*Top.* I.2) of the importance of dialectic for science (the search for *archai*). This problem I have tried to solve by formulating a hypothetical method in part based upon his use of dialectic.

¹² Both quotations are from Galston, *op.cit.* (note 10), p. 86. This enables us to explain the function of the so-called *sophistical appendix* of the *Topics*, *On Sophistical Refutations*: "*On Sophistical Refutations* provides less a program to follow than a catalogue of pitfalls to avoid" (Galston, p. 89).

The aim of this treatise is to find a method with which we will be able to syllogize on any given *problēma* that is put before us on the basis of *endoxa*, and (with which) we will not utter a contradiction while upholding an argument ourselves.^{13,14}

As the roles of the debate can be performed by either of the disputants¹⁵, the method is of great importance for philosophical inquiry: the philosopher can wear both hats as he examines views on a subject; he can extract implications and explore connections. In short, he can test and when necessary refute the consistency of the views ('theories'¹⁶) of others. I will return to this ability later.

The *second* function of the dialectical method is directed towards everyday encounters (conversations¹⁷): it provides us with a good position to argue on any subject and correct our adversary when necessary. Note that here too a critical element is present, aiming at *correcting* other people's views when 'not well put'.

¹³ 'Ἡ μὲν πρόθεσις τῆς πραγματείας μέθοδον εὑρεῖν ἄφ' ἧς δυνησόμεθα συλλογίζεσθαι περὶ παντὸς τοῦ προτεθέντος προβλήματος ἐξ ἐνδόξων, καὶ αὐτοὶ λόγον ὑπέχοντες μὴθὲν ἐροῦμεν ὑπεναντίον. (*Top.* I.1, 100a18-21); J. Brunschwig, *Les Topiques*, 1967, p. 1 (and n. 4 on p. 114) deletes *προβλήματος* here for several reasons; but his argument that the word was not very common is contradicted by Aristotle's remark in *Top.* I.11. Furthermore, that Alexander leaves it *In Top.* p. 5, 23 out can hardly be decisive: see *In Top.* p. 7, 1 and 7, 4 where the complete phrase *does* occur.

A. Zadro, *Aristotele. I Topici* (1974, p. 310 f.), is also surprised that Brunschwig after praising Alexander as a trustworthy source then holds that there is an interplay of glosses between Alexander's text and the ms. A. But Zadro still wants to delete *problēma* here [followed by Beriger, (*supra* n. 7) p. 28 n.] and argues that what should be decisive is not the paleographical evidence, but the consideration that the phrase *περὶ παντὸς τοῦ προτεθέντος προβλήματος* is too limited ("troppo limitativo", p. 311; his reference to K.-G. I, 631 ff. is rather puzzling). I find neither argument very compelling: dialectic reasoning is primarily about *problemata* (*Top.* I.4, 101b16 f.) and Alexander (pp. 5-7) seems to use the two phrases as equivalent expressions (which also seems to be indicated by, e.g., *Soph.El.* 183a38, *περὶ τοῦ προβληθέντος*).

The twofold task as described here is also clear from the brief allusion in *Rhet.* I.1, 1354a5, ἐξετάζειν καὶ λόγον ὑπέχειν. Note that in this "catchword"-reference the mark of dialectic is not to *syllogize*, but to *test*; cf. *infra* n. 53.

¹⁴ Aristotle considered the elaboration of the task of the answerer as his special contribution to the theory of dialectic (cf. *Top.* VIII.5, 159a32 ff., his boastful remark in *Soph.El.* 34 183b8-12, and the important responsibility of the task of the answerer in *Top.* VIII. 11, 161b16 ff.).

¹⁵ See for instance *Top.* VIII, 14, 163a36-b4; cf. 155b10-1. The possibility of interiorising the dialogue is also accepted (and clarified) by, e.g., L.H.G. Greenwood, *Aristotle: Nicomachean Ethics vi* (Cambridge 1909; repr. 1973, Arno Press, N.Y.), pp. 128-32; De Pater, *Les Topiques d'Aristote et la dialectique platonicienne. La méthode de la définition* (Fribourg, Suisse 1965), p. 78; P. Moraux in G.E.L. Owen (ed.), *Aristotle on Dialectic. The Topics* (Oxford 1968), p. 301, 311 n.; Galston, *op.cit.* (n. 10), p. 87 ff.

¹⁶ On the concept of what a theory should be or consist of according to Theophrastus and the (relative) lack of a concept among the Presocratics, see *infra* pp. 15-17.

¹⁷ ἐντεῦθεν *Top.* I.2, 101a30.

6 Theophrastus

The *third* and most important function¹⁸ of dialectic is the claim of its usefulness for philosophy. After his contention that dialectic is useful for the philosophical sciences, Aristotle goes on to say that it is useful:

also with regard to the primary things of each science. For it is impossible to say anything about them on the basis of the principles that belong to the science at issue ... so it is necessary regarding these to go through the *endoxa* on each of them. This then is the specific and most proper characteristic of dialectic: for being critical [or: investigative¹⁹] it forms the road to the principles of all methods.

What Aristotle's words indicate is this: dialectic provides the only method in which we can determine basic principles because these cannot be deduced from the principles proper to a science nor from even more primary ones. Our alternative source is a specific category of opinions, the *endoxa*, that is, the "accepted views held by every one or the majority or the most reputable persons ..." (*Top.* I.1, 100b21-23).²⁰ This description betrays his motive for choosing the *endoxa*: at the background is the *argumentum e consensu omnium* which serves as an ultimate limit against a *regressus* of proofs. Principles allow no proof and therefore we must try to find them by a discursive process scrutinizing the current views. This implies a strong position for opinion. *Endoxa* represent 'qualified opinions'²¹ backed up, as it were, by the authority either of a majority or of specialists who are famous

¹⁸ Aristotle calls it the feature that is ἴδιον ἢ μάλιστα οἰκεῖον τῆς διαλεκτικῆς (*Top.* I.2, 101b1 f.). Note that Aristotle does not say anything about the relationship between these three functions (see also *infra* n. 25). Interestingly, the Greek commentators, who were often reproached for formalizing Aristotle's critical arguments into syllogisms (Weil, *op.cit.*, p. 292) could very well have done so partly because of their knowledge of Aristotle's claim in *Top.* I.2 (e.g. Simplicius *In Phys.* 47, 22 Diels; Alexander *In Metaph.* 174,3 Hayduck; Asclepius *In Metaph.* 140,7 Hayduck) that this procedure based on *endoxa* should be applied in research.

¹⁹ ἐξεταστική. It represents the serious attempt to scrutinize other people's views and convictions and to "prick the bubble of an individual's intellectual conceit" as G. Ryle put it (in: "The Academy and Dialectic", *Collected Papers, vol. I: Critical Essays*, 1971, p. 105).

²⁰ For a new interpretation and translation of the term *endoxa* as "reputable" instead of "probable", see the interesting article by J. Barnes, 'Aristotle and the Method of Ethics', *RIPh* 34 (1980), 500 f. His analysis includes etymological considerations and is persuasive. Still, the translation does have the minor flaw that "reputable" is rather narrow in English and "reputed" would fit the general meaning better. Barnes's translation of the term can now be found in the revised edition of the Oxford Translation of *The Complete Works of Aristotle* (ed. by J. Barnes, Princeton U.P. 1984, 2 vols.).

²¹ This apposite qualification is used by J.D.G. Evans, (*op.cit.* n. 9), pp. 78 and 80-3; with "qualified" Evans means "qualified by reference to some person", but also "experienced", as in 104a15, 33-37; 104b19-28. The mark of a dialectical discussion is δόκει, as was pointed out long ago in the field of ethics; see J. Burnet, *The Ethics of Aristotle*, 1904, xl-xlvi. In this field dialectic has received considerable attention; see for further literature J. Barnes, *op. cit.* (previous note), p. 494, n. 7, and T.H. Irwin, 'Aristotle and the Method of Ethics', in: D.J. O'Meara (ed.), *Studies in Aristotle* (Washington 1981), p. 195, n. 3.

and reputable. It is in this connection that Aristotle takes up the ‘arguing from two sides’: “... being able to evaluate the problems in both directions it will be easier for us to see in each case what is true and what is not” (*Top.* 101a35-36; cf. 163b9-12). At this stage the boundary between dialectic and scientific argument is extremely thin. Choosing accepted opinions that are worth considering and applying to them the critical forces of dialectic may lead to rejecting what is not true and to holding on to that which cannot be proven wrong: the remaining hypotheses and insights may be regarded as approximations of the truth.

What this shows is that Aristotle envisaged the dialectical inquiry into first principles to take place within the realm of opinions (which serve as a starting point for investigation). It also shows that this scrutiny of possible solutions takes place between the extremes of agreement and disagreement. His particular concern with problematic issues—which reflect disagreement—suggests that, in general, agreement is what he accepted as a criterion for truth.²² It evolved into an attitude of examining all existing views on a subject, however contradictory, and to consider the possibility of alternatives or a compromise.

We can compare this attitude with several other statements he made; in a way they give us a glimpse of his thoughts on the history of ideas and tradition. In his *Politics* (1264a1 ff.), for instance, he states that “everything has been invented already” and also that “one man is unable to find truth in every respect, but we cannot all fail”. We may even compare a remark in the *Rhetoric* where he says, “The true and the approximately true are apprehended by the same faculty. It may be noted that men have a sufficient natural instinct for what is true, and usually do arrive at the truth. Hence the man who makes a good guess at the truth is likely to make a good guess at what is *generally accepted*”.²³ It is also in keeping with his epistemological rule that “all teaching starts from what is already known” (*APost.* I.1).²⁴ The (different) motives for this application can be inferred from several of his dialectical introductions.²⁵

²² Cf. De Pater (*op.cit.* n. 15), who translates *endoxon* as “indice non-vérifié de la vérité” (p. 76).

²³ 1355a14 ff. Here the truth and *endoxa* appear in one context in relation to the (same) faculty that apprehends them.

²⁴ It may be significant that the term *endoxon* is often linked with γνώριμος (as, e.g., in *Top.* VIII.5, 159b8 f.).

²⁵ To name but a few examples: in his *On the soul* he states, “It is necessary for investigators into the soul to go through the problems we want to solve and *take those opinions from the past as have been stated on the subject* so that we may hold on to what has been stated rightly and beware of what was not said correctly” (*De an.* I.2, 403b20-24; “hold on to”: λάβωμεν; “try to avoid”: εὐλαβηθῶμεν; see also I.1, 402b5 εὐλαβητέον). In his *Metaphysics* he implicitly appeals to the argument of the *consensus omnium* for justifying his choice of *archai*, e.g., “all seem in an unclear way to reach these principles” (πάντες ἀμυδρῶς μὲν ἐκείνων δὲ πως φαίνονται θιγγάνοντες, 988a22 f.; cf. 988b17, 993b3-4).

8 Theophrastus

Having discussed the most significant passages of the *Topics* which clarify the function of dialectic in philosophical research²⁶, we may now conclude this section by summarizing the picture that emerges from this discussion of Aristotle's *Topics*, adding the remaining elements not yet mentioned.

By way of providing an introduction to his own systematic inquiries, Aristotle offers an inventory and critical evaluation of all the views²⁷ that exist or even are possible concerning a given philosophical or scientific problem. The scrutiny can be carried out on two levels: on the one hand, isolated statements can be tested as to correct predication, that is, the correct coupling of predicate and subject (*Top.* II-VII) which should represent an existing state of affairs. On the other hand, the cohesion of various statements is tested as to consistency and logical dependence (as explained above).

Aristotle was much concerned with problematic statements.²⁸ In his view such statements indicate a question which either has not yet been solved or has received too many solutions (i.e., states an *aporia*²⁹). The *endoxa* provide a sort of reservoir from which problems, starting points and arguments may be chosen in order to ferret out the inconsistencies and, subsequently, to eliminate them.³⁰ What survives such scrutiny may be considered to be near the truth. For according to Aristotle, the *communis opinio* is a blend of the true and the false. The movement towards the truth should therefore begin with elimination of the false ingredients.

In a special use of the method, which according to Aristotle is its most typical function, it is used to reach the basic principles of all the sciences. For as these principles cannot be proved (which would mean referring to even more primary principles) we have no other option but to collect all possible solutions from the "accepted opinions" and scrutinize them: those that survive scrutiny will inevitably be correct. In this way dialectic displays critical and investigative functions on historically given material and is regarded as a necessary preliminary for every science.

²⁶ Much more could be said on this point, but this would exceed the scope of the present inquiry (see also the paper by J. Mansfeld in this volume). For a concise and updated account of the dialectical procedure with more emphasis on explicit methodological statements in the *Topics* relating to philosophy see now A. Beriger, *op.cit.* (*supra* n. 7), esp. ch. 4.

²⁷ See for instance E. Berti, 'Aristote et la méthode dialectique du *Parménide* de Platon', *RIPh* 34 (1980), 341-58.

²⁸ The technical term in the *Topics* is *πρόβλημα* (defined at 104b1-5), "controversy". Cf. *infra* n. 56.

²⁹ For the role of the aporetic approach, even more present in Theophrastus' extant writings, see *Metaph.* B.1, 995a24 ff. and P. Aubenque in S. Mansion (ed.), *Aristote et les problèmes de la méthode* (Louvain 1961), pp. 3-19.

³⁰ As Weil put it (*op. cit.* p. 97): "*Topics* is not a logic of the plausible, of the probable, or of opinion: it is a technique for extracting truth from current discourse—or rather, for eliminating falsehood".

Through this reassessment of the dialectical procedure, the better understanding of its investigative quality, its more than 'probable' basis and its intended use in research, it is now clear, I believe, how this method stands at the crossroads of Peripatetic philosophy and 'doxography'.³¹

II. GENERAL STRUCTURE OF THE FRAGMENT

Before we discuss any specific points in the *De sensibus* it may be helpful to look at the general structure and make a few preliminary remarks in order to convey the well-organised nature of Theophrastus' working method in this fragment.

Any one who has looked at the *De sensibus* will immediately be struck by its systematic and condensed structure. The whole work is divided into two major parts, the first dealing with the senses and sense perception, the second with the objects of sense (*aisthēta*). Furthermore, the accounts of the theories are brief, yet very informative, and often followed by a critical evaluation. The best place to learn much about the nature of Theophrastus' approach is the introduction (§§ 1-2): the orderly beginning and the extremely short but complete preview of the material is a deliberate attempt to arrange the historical material in a controllable fashion. Because of its importance I shall discuss the two first paragraphs *in extenso*.

The first sentence reads:

On sense perception the many opinions are, broadly speaking, of two kinds: some (people) let it come about by similarity, others through contrast.

This *diaeresis* or division which aims at making a comprehensive classification (in this case by dichotomy)³² resembles the approach we are familiar with in Aristotle.³³ But this is not the only feature of the disciplined order. After the *diaeresis*, the names of the representatives of the two 'rival' parties are given, as well as the two or three most important arguments they used in favour of their claims (or seemed to have used according to Theophrastus). I translate:

The first party is persuaded by the fact that (a) things are mostly interpreted by likeness and (b) that it is a natural attribute of all living beings to know what is familiar, also

³¹ For the reason of the inverted commas see *supra* n. 4.

³² A *diaeresis* is of course not always dichotomous; perhaps Theophrastus preferred this simplest form of antithesis. That this causes some problems can be seen later: at the beginning of new sections discussing another Presocratic, Theophrastus refers to the principle each thinker adheres to; in the case of Alcmeon (§ 25) and Democritus (§ 49) he unsuccessfully looks for a clear indication for fitting them into the framework of the initial division. See also my remark *infra* n. 39.

³³ Often compared with *Physics* A (see 187a12), as for instance by Diels (*D.G.* 105) and Regenbogen (*RE* Suppl.vii. 1536, 61-3). But one might compare, e.g., *GC* A.1; B.7; *Meteor.* A.6-7 and *Metaph.* M.1 1076a16 f. (cf. *infra* n. 43).

10 Theophrastus

(c) that sense perception occurs by means of effluences and that like is drawn towards like.

Those that subscribe to contrast opted for this position, supposing that (a) sense perception comes about by a qualitative change and that (b) like is not affected by like, but that opposites do affect each other. And they believe that this is evidenced by what happens in the case of the sense of touch. For the hot or the cold that has the same degree of heat or coldness as our flesh does not cause sensation.

In this extremely brief preview of the arguments Theophrastus displays his ability to summarize items which are discussed elaborately later: the three key-phrases of the 'likeness-party' refer to "recognizing through similarity", "to know what is familiar", and "perceiving through effluences and on the principle of like being drawn towards like" (cf. § 6 and 8). Next the arguments of the 'contrast-party' are summarized: "sense perception through (qualitative) change" (cf. § 31), "like is unaffected by like" (cf. § 27, 49), and "evidence in the case of the sense of touch" (cf. § 28).³⁴

Then, in a very orderly way again, the introduction is explicitly ended with a summarizing remark as if to close a circle: "these views, then, on sense perception *in general* were handed down to us". But as becomes clear from the next sentence this concluding remark also serves to introduce the next issue: "as to *each of the senses separately* the others virtually fail to express themselves (σχεδὸν ἀπολείπουσιν), but Empedocles makes an attempt to refer these (πειράται ... ἀνάγειν) to similarity as well" (my italics). The contrast is here between καθόλου and (περὶ ἐκάστης δὲ τῶν) κατὰ μέρος. This method of starting at a general level and proceeding to the specific level is a feature already known from Aristotle,³⁵ but interestingly it is also a significant feature of Theophrastus' methodology in the botanical works.³⁶

In view of the ensuing discussion of dialectical features, two things must be kept in mind here: (1) the *diaeresis* states mutually exclusive positions; (2) the author expects the theories to give explanations at both the general and the specific level, which in addition must be explicitly linked.³⁷ It is these points of criticism that allow us to draw out some of the presuppositions on the part of the author.

Next, if we follow the text beyond the introductory paragraphs, we see that the views of the representatives of both parties are discussed: first the 'likeness-party', that is Parmenides (2 paragraphs), Plato (also 2 paragraphs) and then

³⁴ Although Heraclitus is also mentioned as a representative of the contrast-party, the arguments are almost all from Anaxagoras (§§ 27-37), as the references show. The occurrence of Heraclitus here is a minor problem which I cannot pursue now.

³⁵ Cf. Bonitz, *Index* 226a4 ff.

³⁶ See Georg Wöhrle, *Theophrasts Methode in seinen botanischen Schriften* (Studien zur antiken Philosophie), Amsterdam 1985, p. 23 (on HP) and p. 43 (on CP).

³⁷ For these aspects of expository practice in a (theoretical) account of sense-perception, cf. Aristotle's *De an.* B.5, 416b32; B.6, 418a7 ff.; *De sensu* 439a6.

Empedocles, who gets considerable attention.³⁸ I shall return to some of the critical remarks later.

After Empedocles we encounter Alcmeon, Anaxagoras, Clidemus, Diogenes of Apollonia and Democritus.³⁹ Of these only three are extensively criticised, whereas Alcmeon and Clidemus seem to be 'appended' because of agreement or disagreement on a specific point with others.⁴⁰

In the second part of the text (§§ 58 ff.) Theophrastus wants us to believe that most thinkers have neglected or have only poorly commented on the objects of sense. This verdict is passed upon them in a casual mentioning of some of their remarks (§ 59), after which Theophrastus goes on to discuss Democritus (§§ 60-81) and Plato (§§ 82-91). Again the plan of exposition is according to the division into mutually exclusive positions⁴¹ and again precise and thorough criticism is added to the elaborate *exposé* of their views.

What are we to make of this peculiar catalogue of different views initially reduced to a *diaeresis*? First, reducing the transmitted views into two theses squares well with Aristotle's working procedure: the division is a very economical device to set out the subject. Through the reduction of the possibilities of general explanation to two theses, the problem becomes in an way surveyable and tractable. After that one can add the related views of some representatives and important arguments and undertake the necessary examination "from both sides".⁴² Although in this form the opening sentence has no exact parallel, we may take it as the usual Peripatetic way to start a dialectical discussion of historical material.⁴³ It should

³⁸ It is clear that Theophrastus' tacit approval with his "referring them to similarity"—expressed by the technical term *anagein*—gave rise to his primary position in the likenes-party. Still, Empedocles is also criticised at great length.

³⁹ Theophrastus explicitly acknowledges Alcmeon and Anaxagoras as members of the contrast-party, but in the case of Clidemus he does not. Diogenes (§ 39) even seems to be misplaced in the sequence of those favouring contrast: Διογένης ... δόξειεν ἂν τῷ ὁμοίῳ ποιεῖν <sc. τὴν αἴσθησιν>. It is also noteworthy that Democritus (§ 49) seems to belong to both (or neither). Interestingly, these three cases were not mentioned in the introductory *diaeresis*. I can not go into this matter further.

⁴⁰ Alcmeon's theory of the brain (§§ 25-6) can be linked to that of Anaxagoras (§ 28) and contrasted with Empedocles' (see § 25 οὐ, καθάπερ Ἐμπεδοκλῆς, referring to § 10), whereas Clidemus' view concerned with the νοῦς seems to be contrasted with Anaxagoras' (§ 38).

⁴¹ Theophrastus even says that they both seem to give explanations which would fit the thesis of their 'opponent' better: ὥστε δόξειεν ἂν ἐκάτερος ἐναντίως τῇ ὑποθέσει λέγειν (§ 60). This immediate evaluation of the relation between the basic assumption and the supporting arguments is an important feature of Theophrastus' 'theoretical demands'. Cf. *supra* n. 32 and *infra* p. 15 f.

⁴² As is the phrase in *Top.* I.2 expressed by the words πρὸς ἀμφοτέρω διαπορήσαι, this being the step that precedes the solving of a problem, εὐπορήσαι (on these steps of the aporetic procedure see *Metaph.* B, 995a24 ff. and *supra* n. 29).

⁴³ For instance, I cannot find a good parallel in which δύο is a generic term reducing

12 Theophrastus

be noted that this starting-point allows the author to add material later on, which might be the case with Alcmeon and Clidemus, who were not criticised.⁴⁴ It also turns out that names and views on the subject are added later on which were not mentioned in the first paragraphs.

Furthermore, the presentation of the relationship between the different views is of a systematic nature which is evidenced by several cross-references. At the background of this are probably Aristotle's remarks, *Top.* I.14, where he gives the advice to make lists of the views of philosophers on certain subjects and annotate them.⁴⁵ Finally, it should be noted that the subject or theme of this fragment (lecture? treatise?) is broader than the opening-words suggested: not only sense-perception and pleasure and pain are discussed, but also thinking (in the case of Parmenides, Anaxagoras, Diogenes, Democritus). We must presume that this is due to the fact that he echoes much of the actual content of the sources he had at hand.⁴⁶

To conclude this section now, let me emphasize those points that are important for what follows.

1. In the introduction I have argued that the status of the *De sensibus* and its value as a source of information should be re-investigated after a methodological inquiry.

2. I have pointed to at least one feature also present in Aristotle's dialectical introductions (it being the most conspicuous one), viz. the *diaeresis* at the beginning of the work. As far as I know this was mentioned only by James Longrigg, who however did not explain it.⁴⁷

3. It has been indicated that Theophrastus adds objections to his *exposé* of a theory and systematically tries to criticise it.⁴⁸

4. The discussion of some general characteristics was meant to expose the systematic and orderly structure of the treatise pointing to an underlying pattern which deserves closer investigation.

"many views" (πολλαί) to "two kinds", instead of being merely a numerical device; perhaps we can compare Arist. *Metaph.* 1076a16f. δύο δ' εἰσὶ δόξαι περὶ τούτων (*De an.* 403b28 is more literal). For more examples of implicit and explicit *divisiones*, cf. *supra* n. 33.

⁴⁴ Cf. *supra* n. 39.

⁴⁵ *Top.* I.14, 105b12 ff. χρή ... τὰς δὲ διαγραφὰς ποιεῖσθαι περὶ ἐκάστου γένους ὑποτιθέντας χωρὶς (on this topic see also the paper by J. Mansfeld in this volume, p. 73).

⁴⁶ Theophrastus seems to follow his source-text rather closely in this respect. But, as Stratton already remarked (p. 15, n. 1), that the broader perspective of the Peripatetic doctrine (e.g. Ar. *De anima*, A.1, 402b13; Γ.3; *De sensu*, 437a1) was part of Theophrastus' initial plan can be inferred from the concluding remark of the first part of the treatise (§ 58) where it is said: "These then are the views on sense perception *and on thinking* that have by and large come down to us from those of the past" (my italics).

⁴⁷ 'Two Notes on Theophrastus' de Sens., *Philologus* 119 (1975), p. 163.

⁴⁸ For evident indications of this attitude see *infra* n. 61.

III. ANALYSIS

I shall now go into some detail and try to adduce examples which indicate that Theophrastus' mode of presentation and evaluation is dialectical. The examples should be regarded as representing certain classes of *tendencies* and *characteristics*. These become clear only if we look for them from a broad perspective: very often the indications will be scattered throughout the argument, being signs of a more or less unconsciously applied tactic. I begin with those features which are most obvious (vocabulary), but will also point to more hidden ones which are present in the text.

(1) The first class of examples (best understood as a tendency) concerns the demand that is posited time and again for clear and explicit *definition*, or the *demarkation of concepts and terms*. From a terminological point of view this is evidenced by the fact that the verb ὀρίζειν (or composites thereof)⁴⁹ occurs in almost all critical passages. This demand seems justified in many cases, but in a number of cases it strikes one as being external or mere 'Wortstreit'.⁵⁰ But from a Peripatetic point of view it was common practice in a dialectical discussion to ask for an unequivocal use of words and sentences.⁵¹ That this could lead to an argument which seems to us irrelevant or unfair is a quite different matter. In the *Topics* Aristotle "sometimes suggests counter-arguments which seem to be so irrelevant to the matter in question that we are justified in drawing the conclusion that he did not believe in or even did not fully grasp the implications of the thesis against which these arguments were to be used; *his criticism is external, not immanent*" (my italics).⁵²

From a methodological point of view, Theophrastus also seems to have favoured this kind of explicitness with regard to the structure of a theory and its application of the principal explanation(s); I already pointed to Theophrastus' remark (*De sens.* 2, *supra* p. 10) that only Empedocles could be found to link the general rule *explicitly* to the more specific level of the individual senses.

It goes without saying that the emphasis on verbal clarity ('definition') is an extremely important element of the task of the dialectician: testing propositions and rejecting them on the ground of ambiguity or lack of clarity is a basic rule of correct reasoning. Definition had still a central role in the procedure, as is clear from Aristotle's statement in *Top.* I.6 that all predicables—genus, definition,

⁴⁹ Some statistics: ὀρίζειν occurs 28 times (of which 13 ἀφ-, 8 δι-, 3 προσαφ-); cf. διορισμός, § 19 and expressions such as ἀκριβολογεῖται (§ 6), δεικτέον (§ 52), διασαφέω (§ 81), διακριβοῦν (§ 82), or, conversely, σαφῶς, ἀόριστον.

⁵⁰ Regenbogen, *op.cit.* (n. 5), 1401. For some examples of this line of interpretation see Stratton *op.cit.* (n. 3), p. 60 ff.

⁵¹ See for instance *Top.* I.15, 106a9 ff., and *Soph.El. passim*.

⁵² Düring in G.E.L. Owen (ed.), *op.cit.* (n. 15), p. 206.

14 Theophrastus

accidens—are related to the definition.⁵³

(2) The second class of examples represents a remarkable feature which I have provisionally labelled *endoxic context*. With this term I am referring to the fact that Theophrastus in several ways connects the views of different groups, especially those that are usually mentioned in the *Topics* concerning the *endoxa*. He compares views of the *sophoi* with views “commonly held” and also tries to determine or indicate their relationship in terms of agreement and disagreement. Certain cross-references I pointed out before (n. 40) are a sign of this tactic. But also the references to common opinion (δοκεῖ ἅπασιν and the like)⁵⁴ fit the tendency to pinpoint the views on a scale of originality. A few examples may suffice to show this attitude:

(a) within the group of *sophoi*

§ 57 (Democritus) “It is unreasonable and *unparalleled* (to suppose) that the sound pervades the whole body” (ἄτοπον δὲ καὶ ἴδιον <τὸ> κατὰ πᾶν τὸ σῶμα τὸν ψόφον εἰσιέναι ...).

§ 38 “Clidemus alone expresses an *idiosyncratic* view about the sense of sight” (Κλειδήμος δὲ μόνος ἰδίως εἴρηκε περὶ τῆς ὄψεως ...).

(b) common view, often rejected

§ 37 “This is a general and old view ... ” (κοινὴν τινα ταύτην καὶ παλαιὰν δόξαν); see also § 36.

§ 72 “This is a very old doctrine, for all the ancients, the poets as well as the wise, explain thinking according to the (physical) constitution” (ἀρχαιότατη δόξα, πάντες γὰρ οἱ παλαιοὶ καὶ [οἱ] ποιηταὶ καὶ σοφοὶ κατὰ τὴν διάθεσιν ἀποδιδόασιν τὸ φρονεῖν).

This is of course related to the characteristic already stressed by Diels,⁵⁵ namely that Theophrastus points to original (*idia*) and common (*koina*) elements in the views at issue. But the perspective is a broader one: the *endoxa* are here discussed as to their ‘influence’ within a group exactly in the way the definition of *Top.* I.1 describes it. The problematic character of certain views is related to their degree of originality.⁵⁶ Disagreement divides and demands a settlement. It can mean one

⁵³ Aristotle explains that they are in a way “definitory” (τρόπον τινὰ ὀρικά), but that there is hardly one method to study them all (102b34-36).

⁵⁴ § 82 (see also below n. 59). There seems to be a problem as to the scope of ἅπασιν here: it is of some importance to determine whether he means everybody or all philosophers.

⁵⁵ ‘Leukippos und Diogenes von Apollonia’ in *Rhein.Mus.* N.F.42 (1887), p. 9.

⁵⁶ We may call to mind the definition of the πρόβλημα in *Top.* I.11, 104b1-5: ἐστὶ διαλεκτικὸν θεώρημα ... περὶ οὗ ἢ οὐδετέρως δοξάζουσιν ἢ ἐναντίας οἱ πολλοὶ τοῖς σοφοῖς ἢ οἱ σοφοὶ τοῖς πολλοῖς ἢ ἐκάτεροι αὐτοὶ ἑαυτοῖς.

against many or all; still, individual views are not untrue *per se*.⁵⁷ To understand the problems in a field the points of disagreement are extremely valuable.⁵⁸ The weighing of the arguments takes into account the majority-criterion: when most or all hold the same view it cannot be neglected and has a *prima facie* claim to be true.⁵⁹ On the other hand, a view of *one* person may at times outweigh that of the majority; and the views of the unqualified majority (οἱ πολλοί) seem to have a negative ring to them (e.g. § 36).

These features in the approach of Theophrastus are clearly indications of dialectical standards. The dominant role of the *endoxa* of the *sophoi* and the way in which they are treated are significant.

(3) The third class of examples can be mentioned briefly, because it cannot in itself be decisive for our main question whether the argumentation is dialectical or not. But taken in conjunction with the other aspects it supports the gist of my analysis. I am referring to the *aporia* or aporetic approach. This feature is well-known from other Theophrastean writings.⁶⁰ In the *De sensibus* the aporetic attitude is visible in almost every critical passage: next to the vocabulary pointing to problems (ἀπορία, ἀπορέω, δυσχερές, ζήτησις etc.) the raising of objections in itself can be ascribed to his attempt to criticize and refute the views under discussion.⁶¹

Starting with Socrates and Plato this *terminus* has now merged into the language of the Peripatetics as a common *façon de parler* referring to research and examination (the phrase ἀπορήσειεν δ' ἂν τις is idiomatic in this respect). As such it cannot without further consideration be used to label the approach 'dialectical', although the term *aporia* does seem to have this connotation in *Metaph.* B.⁶²

(4) I proceed to a fourth example, namely, the demand for *consistency*. The 'theories' under discussion are put to a severe test in this respect. Theophrastus tries to spell out the implications of certain statements or to point to defects. This is a procedure which in relation to Plato has been called the 'straw-man technique'.

⁵⁷ In the *Topics* Aristotle states that one should not take seriously the view of just anyone (τοῦ τυχόντος, I.11, 104b22-24), but that one should consider the views that seem paradoxical and still have some justification (διὰ τὸν λόγον ἔχειν, *Top.* I.11, 104b28; I.14, 105b17-18; cf. *De sens.* § 31).

⁵⁸ See *Metaph.* B, 995a26-b7.

⁵⁹ For this aspect see for instance *De sens.* § 57 (τοῖς πλείστοις), 70, and 82 (φαίνεται παῖσιν, δοκεῖ ἅπασιν).

⁶⁰ As is for instance evidenced by his *Metaphysics* and the statement of Themistius referring to Theophrastus' *On the soul* (*In De an.* 108, 9-10 Heinze) that the work is "perplexing and full of aporiai" [Here I would like to thank Prof. W.W. Fortenbaugh and Prof. P. Huby for generously putting at my disposal the unpublished material on the fragments concerning sense perception and thinking from Priscianus, Themistius *et al.*].

⁶¹ That critical evaluation (and refutation) is what he aims at can be inferred from e.g. εὐοικεν ἀποτέμνεσθαι τῇ φάσει τὰ συμβαίνοντα δυσχερῇ (§ 4) and ὅπερ ἂν δόξειεν ἀκόλουθον εἶναι τῇ ὑποθέσει (§ 29).

⁶² Cited *supra* n. 58.

16 Theophrastus

In each case contradictions may arise. It seems to me that here we have a clash of different levels of 'theoretical construction' in which Theophrastus confronts the Presocratic level of 'theorizing' (which is rudimentary) with his own far more developed and strict concept of a theory.

The vocabulary again provides sufficient indication of this characteristic: contradictions occur in the case of (i) two contradictory propositions explicitly stated, or (ii) because of implications, or (iii) by contrasting a statement with the facts ('empirical feedback'). The following examples may be adduced:

(i) §13 Empedocles is contradicting himself (διαφωνεῖν⁶³ ἑαυτῷ), unless he explains further the difference between fire within and without. Here a lack of clarity in meaning is used to extract from the argumentation an implicit inconsistency.

(ii) § 53 A very clever implication of Democritus' idea of the working of sight drives home the criticism Theophrastus aims at, namely that the notion of effluences is unacceptable: "moreover, why does not each eye see itself?"⁶⁴

(iii) § 31 In the case of Anaxagoras the *facts* are against his contention that we perceive always with pain: οὐτ' ἐκ τῆς χρήσεως ὁμολογεῖται.

Of course the major offence against consistency is to be neglectful of one's own basic principle. These examples can be augmented further. It shows the intrinsic value of the dialectical training, viz. the insight into consistency, in the service of a philosophical investigation.

(5) The fifth tendency is a criterion related to the demand for consistency, viz. universal validity. Against Theophrastus' searching criticism based on more elaborate theoretical and empirical considerations most claims of universal validity cannot survive. In many cases Theophrastus points to exceptions that were neglected or not explained properly, which almost always amounts to saying that they over-generalized their statements. Thus he blames Anaxagoras for having used too slight a principle in an attempt to explain all sense-perception (ἀπὸ μικρῶς ἀρχῆς ἐφ' ὅλην μετήνεγκε τὴν αἴσθησιν, § 33). Similarly in the case of ἔμφασις the σκληρόφθαλμοι form an exception, to which Anaxagoras' explanation does not apply.

In passing I would like to suggest that the underlying thought of Theophrastus' criticism may have originated in the concept of *genos*. The degree of extension⁶⁵

⁶³ This expression, later a technical term among the sceptics, occurs only here.

⁶⁴ Καὶ πρὸς τούτῳ διὰ τί ποτε ἕκαστος αὐτὸς αὐτὸν οὐχ ὁρᾷ; One is immediately reminded of Aristotle's objection on this issue, when he asked why the eye did not see itself (*De sensu* 437a28 f.). This shows that Theophrastus took his own liberty at finding appropriate refutations.

⁶⁵ 'Grado di estensione', E. Berti, *Aristotele. Della dialettica a la filosofia prima* (Padua 1977), p. 183. For the anticipation of the concept of subordination in the *Topics*, see Kneale & Kneale, *The Development of Logic* (Oxford, Clarendon Press, 1986, ¹1962), p. 36.

or applicability, which in the context of predicables characterizes the concept of *genos*, may have been transferred to reasoning. Within a theoretical construct a basic principle should also have general applicability and therefore Theophrastus focuses on generalizing statements which can be undermined by pointing to exceptional cases.

(6) My sixth and last class of characteristics concerns a few cases in which I try to relate parts of an argument to a *topos* in the *Topics*. I call these 'topical examples' (with the restriction, of course, that only as an exception will we find a *topos* in practice in the form it was preached).

If we look at an important definition concerning contraries within a genus, we find the following statement: "we should also see whether there is a contrary to the species ... for contraries must exist within the same genus, if and when there is no opposite to the genus" (*Top.* IV.3). This demand to treat things belonging to the same class in the same way is at the background of several objections raised by Theophrastus. We may refer to a few passages in the *Topics* and compare them to the *De sensibus*:

A genus is that which is predicated in the category of essence of several things which are also different in species (*Top.* I.5, 102a31-32)⁶⁶

Also we should see whether there is a contrary to the species [...] First then whether the contrary is in the same genus as well, without there being an opposite genus. For the contrary must be in the same genus when there is no opposite genus (*Top.* IV.3, 123b1 ff.)⁶⁷

This rule can clearly be seen at work in § 82:

If there is an opposite to red, ... it must, as in the case of black (compared) to white, have an opposite form. If there is no opposite, one might wonder about that, viz. that he does not make the principles opposites; for every one thinks they are.⁶⁸

Similarly, the *genos* is referred to in §§ 87 and 35:

This is awkward as well: first of all the fact that he [= Plato] does not give a similar account of all nor of the things belonging to the same *genos*. For while defining the hot through (its) form he did not do likewise with the cold.⁶⁹

⁶⁶ Γένος δ' ἐστὶ τὸ κατὰ πλειόνων καὶ διαφερόντων τῷ εἶδει ἐν τῷ τί ἐστὶ κατηγορούμενον.

⁶⁷ Ἐτι ἂν ἢ ἐναντίον τι τῷ εἶδει, σκοπεῖν. [...] πρῶτον μὲν εἰ ἐν τῷ αὐτῷ γένει καὶ τὸ ἐναντίον, μὴ ὄντος ἐναντίου τῷ γένει. δεῖ γὰρ τὰ ἐναντία ἐν τῷ αὐτῷ γένει εἶναι, ἂν μὴδὲν ἐναντίον τῷ γένει ᾖ.

⁶⁸ Χρῆν ... καὶ εἰ μὲν ἐναντίον τῷ ἐρυθρῷ, καθάπερ τὸ μέλαν τῷ λευκῷ, τὴν ἐναντίαν ἔχειν μορφήν. εἰ δὲ μὴ ἐναντίον, αὐτό τοῦτ' ἂν τις θαυμάσειεν, ὅτι τὰς ἀρχὰς οὐκ ἐναντίας ποιεῖ· δοκεῖ γὰρ ἅπασιν οὕτως. It should be noted that in this passage alone there are three dialectical features to be recognised: *idion*, *genos*, and 'endoxic context'.

⁶⁹ Ἀποπον δὲ καὶ τοῦτο· πρῶτον μὲν τὸ μὴ πάντα ὁμοίως ἀποδοῦναι μὴδὲ ὅσα τοῦ

18 Theophrastus

About this one might have doubts, as was said before, whether this should be formulated in such a manner: for in cases of like character things are not defined according to size.⁷⁰

These instances show that the general idea behind the criticism is guided by the rules concerning the *genos*.⁷¹ It is linked to the applicability of a generalisation, based upon the appropriate demarcation of a class of things. That this could be used as a critical argument is mentioned at *Top.* IV.3, 124a1-2 (ἀναιρουῦντι κτλ.).

Another example of a *topos* in the background of an argument is that concerning the ἴδιον or “distinctive feature” (*Top.* I.5, 102a18 f.). The *idion* states a characteristic that is peculiar to the subject, yet does not belong to its essence. For instance, if we say “man is capable of learning grammar”, we state an *idion* of man (γραμματικῆς δεκτικόν), which does not occur in the definition of “man”. Because of this close relationship with its subject, an *idion* can be predicated convertibly: e.g., “if a certain being is capable of learning grammar, it is a man”. In two cases we may reasonably assume that the same concept of *idion* is being used:

Diogenes fails to make it a *distinctive feature* of living beings that they can perceive and think (§ 46, cf. *Top.* V.2, 130b20-21; V.3, 132b19-21);

Democritus should have determined some kind of *distinctive feature* for the colour green. And as he supposed green and red to be opposites, this *idion* should have been an opposite form. (§ 82).

IV. CONCLUSION

To sum up, I think these indications show that a dialectical way of thinking is an important force in evaluating the views of the Presocratic thinkers and Plato. This general tendency is extremely formal, to such a degree that scholars have labelled it ‘unfair’. It lays great emphasis on explicitness of definition, on a clear arrangement of explanatory statements, and on the consistent application of the basic principle on different levels. Nowhere does the ‘opponent’ receive the benefit of the doubt.

The general plan is Peripatetic. The discussion of sense perception (§§ 1-58) and of the objects of sense (§§ 61-92) may be compared to that in Aristotle’s *De anima* and *De sensu*, and the relationship between thinking and perceiving is

αὐτοῦ γένους, ὀρίσας γὰρ τὸ θερμὸν σχήματι τὸ ψυχρὸν οὐχ ὡσαύτως ἀπέδωκεν.

⁷⁰ Τοῦτο μὲν οὖν, ὥσπερ ἐλέχθη, διαπορήσειεν ἂν τις, εἰ ἄρα καὶ δεῖ λέγειν οὕτως; οὐ γὰρ ἐν τοῖς ὁμοίοις γένεσιν ἀφώριστα κατὰ τὸ μέγεθος κτλ. These two cases (nn. 69, 70) are the only ones in the whole text where the word γένος actually occurs. It does not seem to have a clear technical meaning here.

⁷¹ In a less explicit manner, but still sufficiently clear, the same thought occurs at § 72: καὶ πρὸς τοῦτοις ὁμοίως ἐπὶ πάντων ἀποδοῦναι τῶν διὰ τῆς ἀφῆς καὶ μὴ μόνον τὰ περὶ γεῦσιν.

repeatedly discussed. On the other hand, many of the criticisms and refutations seem to be inspired by the occurrence of a topic in the source-text (Aristotle? original?), and it is not always easy to detect a strict plan behind the order of these objections: at times one suspects the author to be showing his expertise at attacking the weak points of the views at issue. In any case, critical evaluation and refutation as such seem to be his chief goal and often an objection is not elaborated.

In conclusion, then, (1) the lucid introduction, (2) the diaeresis of the endoxic material into mutually exclusive positions, (3) the testing of implications and consistency, (4) universal validity and (5) the demand for clarity and unequivocal terminology encourage an investigation into the 'argumentative blue-print' of the *De sensibus*, in order to expose the hidden traces of a dialectical procedure.

This approach has the advantage, first, of shedding new light on the argumentative structure of the fragment and, second, of advancing a new perspective on the status of the text. If we can show that the general approach is one of preparation similar to that found in Aristotle's systematical treatises, we may be able to reach new conclusions with regard to the original purpose of this intriguing fragment. Regarding this problem we must take several possibilities into account: e.g. that it was originally part of Theophrastus' *Physics* or even of the single book on sense-perception mentioned in the catalogue in D.L. If Diels was right in assigning it to the *Physikōn doxai*, he certainly failed to provide a detailed argumentation for this solution.⁷²

The argument set out in this paper has made it clear that the investigation will profit from considering all options anew in the light of recent insights into the dialectical method in Aristotle's work. If the *De sensibus* is a dialectical preliminary (and we have good reasons to think it is), we must ask what role this elaborate text could play in a systematical context. The fact that Theophrastus' discussion was so elaborate can be explained by his greater interest in factual evidence, the important role he ascribed to *aisthēsis* and the lack of a comprehensive and systematic discussion on this subject in Aristotle. Finally, an inquiry from this point of view may also explain a lot about Peripatetic literalism and mitigate the harsh verdict of Cherniss that deliberate distortion was the main approach of Aristotle and his school. Perhaps then we can understand more of this perplexing fragment, its reliability and its value for Presocratic research as well as for Peripatetic methodology.⁷³

⁷² Originally another (incomplete) section in this paper dealt more extensively with the Dielsian thesis, but since there is still much work to be done on this topic I shall discuss it on another occasion.

⁷³ Here I should gratefully mention that my investigations are supported by the Foundation for Philosophical Research (SWON), which is subsidized by the Netherlands Organization for Scientific Research (NWO). I am also grateful to Prof. J. Mansfeld for a number of useful remarks on several versions of this paper, to Prof. W.W. Fortenbaugh for giving me the opportunity to present the paper at the 1989 Eresos Conference of Project Theophrastus and to Prof. A. Laks for giving me the opportunity to try out an earlier version of this paper in Lille (March 22, 1989), after which I was able to make some useful adjustments.

2

Empedocles' Theory of Vision and Theophrastus' *De sensibus*

David Sedley

I. THE EYE

Empedocles speaks in the same way about all the senses, and says that perception occurs as a result of something's fitting into each sense's passages. That is why the senses cannot discriminate each other's objects, because some have passages which happen to be too wide, and some too narrow, in relation to the sense-object, so that some things do not make contact but slip through, while others cannot enter at all.

He tries also to say what the visual organ is like. He says that its inside part is fire, while what surrounds it is earth and air, through which the fire passes, being fine like the light in lanterns. The passages are in an alternating arrangement of fire and water, and, of these, it recognises light things with those of fire and dark things with those of water; for each type fits into each. And the colours travel to the organ of vision by means of effluence.

(Theophrastus, *De sensibus* 7)

In the first part of this paper¹ I want to reconstruct the Empedoclean theory of vision outlined here by Theophrastus, and to assess his presentation of it. We are fortunate to have a significant portion of the text on which Theophrastus' summary is founded:

¹ The most important editions and discussions known to me are: H. Diels, *Doxographi Graeci* (Berlin, 1879); J. I. Beare, *Greek Theories of Elementary Cognition* (Oxford, 1906), 14-23; G. M. Stratton, *Theophrastus and the Greek Physiological Psychology before Aristotle* (London, 1917); G. E. R. Lloyd, *Polarity and Analogy* (Cambridge, 1966), 325-7; J. Bollack, *Empédocle* (Paris, 1965-9) ii 134-5, iii 2 314 ff.; A. A. Long, "Thinking and Sense-Perception in Empedocles: Mysticism or Materialism?", *CQ* 16 (1966), 256-76; D. O'Brien, "The Effects of a Simile: Empedocles' Theories of Seeing and Breathing", *JHS* 90 (1970), 140-79; M. R. Wright, *Empedocles: The Extant Fragments* (New Haven/London, 1981), 240-3; G.

... ἐξ ὧν ὄμματα' ἔπηξεν ἀτειρέα δι' Ἀφροδίτῃ ...

(fr. 85 Wright, 86 DK)

ὥς δ' ὅτε τις πρόοδον νοέων ὠπλίσσατο λύχνον,	1
χειμερίην διὰ νύκτα πυρὸς σέλας αἰθομένοιο,	
ἄψας παντοίων ἀνέμων λαμπτήρας ἀμοργούς,	
αἵ τ' ἀνέμων μὲν πνεῦμα διασκιδνᾶσιν ἀέντων,	
φῶς δ' ἔξω διαθρῶσκον, ὅσον ταναώτερον ἦεν,	5
λάμπεςκεν κατὰ βῆλὸν ἀτειρέσιν ἀκτίνεσσιν·	
ὥς δὲ τότε' ἐν μήνιγξιν ἐεργμένον ὠγύγιον πῦρ	
λεπτῆσιν (τ') ὀθόνῃσι λοχεύσατο κύκλοπα κούρην·	
αἱ δ' ὕδατος μὲν βένθος ἀπέστεγον ἀμφιναέντος,	
πῦρ δ' ἔξω δῖεσκον, ὅσον ταναώτερον ἦεν.	10

(fr. 88 Wright, 84 DK)

5 φῶς] πῦρ *EMPYGa*, *add. supra* ἡ φῶς *il* 8 λοχεύσατο *Förster*: λοχάζετο *EM Yil*: λοχάζεται *Ga*: ἀχείατο *L*: ἐχεύατο *cett.*

From these divine Aphrodite made the unfailing eyes ...

And just as when someone planning a journey through the stormy night prepares a lamp, a flame of blazing fire, fitting to it lantern-sides as shields against the various winds, and these scatter the blowing winds' breath, but the finer part of the light leaps out and shines across the threshold with its unyielding beams; so at that time did she bring to birth the round-faced eye, primeval fire wrapped in membranes and in delicate garments.² These held back the sea of water that flowed around, but the finer part of the fire penetrated to the outside.

In interpreting this text, I shall try to adhere to the following two principles:

(1) Since it is presenting an analogy designed to persuade us that the mechanism of the eye is like that of a lantern, the more closely the two halves of the simile

S. Kirk, J. E. Raven, M. Schofield, *The Presocratic Philosophers* (Cambridge, 1983); and the forthcoming commentary on Theophrastus, *De sensibus*, by André Laks and Heinz Wisman, which the authors kindly let me see in draft. My thanks for advice on some ophthalmological points to Paul Meyer, and for comments and discussion to Jonathan Barnes, Tony Long and especially Dorothea Frede, who, as my commentator at the Eresos conference of Project Theophrastus, suggested a wealth of alternative approaches to this body of evidence. I am sorry that the paper does not do them anything like justice, but they did help me to tighten up my own argument at a number of points. None of those mentioned is in any way responsible for the views expressed here.

² For safety I am omitting here the additional line pieced together by Blass and placed after line 8, which still appears in DK. See Wright's arguments, p. 241.

can be made to correspond without forcing the sense, the better.³

(2) Unless there is positive evidence that Empedocles knew something of the internal structure of the eye through dissection, the presumption should be that he is describing its externally visible features only. As G. E. R. Lloyd has argued,⁴ human dissection at this date is out of the question, and one should be extremely cautious of expecting even animal dissection of any but a very rudimentary kind before the time of Aristotle. One might add that Empedocles, whose theory of transmigration led him to condemn animal slaughter and meat-eating as the most frightful sacrilege, seems of all Presocratics the least likely practitioner of this form of research. As a doctor, Empedocles was no doubt acquainted with eye diseases and their treatment. But that in no way implies familiarity with the eye's internal structure.⁵

Turning now to the details of the analogy, Burnet is surely right to supply Aphrodite, rather than ὀγύγιον πῦρ, as the subject of lines 7 ff., because (a) we know from the single-line fragment which I have ventured to place directly before the lantern passage, what we could have guessed anyway, that Empedocles made Aphrodite the creator of the eye; and (b) a personal subject makes a better parallel with the man who fits the lantern together (invoking Principle 1).

Therefore we must so construe the lines as to make κύκλωπα κούρην in line 8 stand in apposition to ὀγύγιον πῦρ κτλ. Aphrodite brought to birth 'primeval fire wrapped in membranes' (etc.) and that whole package is the κύκλωπα κούρην.

This latter expression has a double meaning: literally Aphrodite brought to birth 'a round-faced child', but also, more specifically and appositely, 'the round-faced eye'. I say 'eye' and not, as it is usually translated, 'pupil', for two reasons. First, assuming, in accordance with my Principle 2, that Empedocles is describing externally visible features of the eye, he would hardly be likely to make the pupil consist of fire wrapped in translucent membranes. The pupil is black, while the most fiery looking part of the eye is presumably the iris. And second, 'eye' is in any case the regular poetic use of κόρη in the fifth century.⁶ The more specific identification with the pupil seems to belong to medical prose terminology.⁷ So I take the description here to cover the evident overall construction of the eyeball, and not, as interpreters have tended to suppose, any hidden internal structure.

³ Pace O'Brien, 154-7. In "The Proems of Empedocles and Lucretius" (*GRBS* 30 [1989], 269-96) I argue that Empedocles is Lucretius' model for his own use of the multiple-correspondence simile.

⁴ "Alcmaeon and the Early History of Dissection", *Sudhoffs Archiv* 59 (1975), 113-47.

⁵ Even cataract operations, if they could be dated back this early (I know of no actual evidence for them earlier than Celsus 7.7.13 ff.), would not have required more knowledge of the eye's structure than could be gathered from external observation.

⁶ Aristophanes, *Vesp.* 7; Sophocles fr. 710; Euripides, *Ion* 876, *Hec.* 972, and often.

⁷ E.g. Hipp., *Carn.* 8.606.7 L; *Int.* 7.284.16 L.

What then are the 'membranes and delicate garments' which surround the fire and are said to be capable of permitting the passage of light but not that of water? They have regularly been understood as membranes inside the eye, postulated by Empedocles as separating the fire from the internal water. But if I am right that the overall structure of the eye is being described, they will be more likely to be the cornea. And that seems to me the preferable interpretation on three separate grounds:

First, on Principle 1, that we should seek to maximise the correspondence between the two halves of the simile, the cornea clearly comes out as the proper analogue of the sides of the lantern, which protect the fire inside from extinction by the elements *outside*.⁸

Second, on Principle 2, that Empedocles is most likely to be describing externally visible features of the eye, there is not much to be said for identifying the items in question with internal membranes whose explanatory function is, to say the least, minor, and which, even if they meant something to Empedocles himself, can hardly have meant much to his readers. On the other hand, the cornea is something both familiar and very special, being, I suppose, the clearest transparent solid substance known to the ancient world. This is confirmed by the praise heaped upon it as a consummate product of divine craftsmanship by Cicero's Stoic spokesman,⁹ whose expression 'membranis tenuissimis vestivit' sounds like a direct echo of Empedocles.

Third, as I now want to go on to argue, Empedocles' account of the eye apparently did not even mention internal water. So any internal waterproof membranes would have been left high and dry, without an explicit function.

What is the water which the membranes are said to keep out? Not, I think, the liquid inside the eyeball, but the moisture on the surface of the cornea—the lachrymal fluid.¹⁰ Again, I can list three reasons for preferring this view:

By Principle 1, wind outside the lantern prevented from getting in should correspond to water outside the eye, not to water trapped inside.

By Principle 2, if Empedocles did not practise dissection, he cannot be assumed to have known whether the space under the cornea contains air or water, or indeed

⁸ This is also Alexander's interpretation in his commentary on Aristotle, *Sens.* 437b23 ff. (In *De sensu* 23, 8 ff., see B84 DK). It is also worth noticing that the cornea is the 'hornlike' (κερατοειδής) tunic of the eye, thus positively inviting the analogy with lantern-sides, themselves commonly made of horn. The technical term may not predate the 3rd-century BC Alexandrian anatomists (cf. Galen, *UP* 10.3), whose motive was no doubt to distinguish the cornea from the other membranes of the eye. But the comparison of its transparency with fine slices of horn (Galen, *loc. cit.*) may well have already been familiar by then.

⁹ Cicero, *ND* 2.142.

¹⁰ βένθος, 'the deep', or 'the ocean', is of course an extravagant term for a thin film of water, but the extravagance is not untypical of Empedocles (whole for part, cf. B 96, 98), and ἀμφιβαέντος, 'flowing round', is appropriate to water on the outside of the eye.

24 Theophrastus

whether the cornea itself extends back to the iris. Even if the evidence of an accidentally severed eye had happened to be available to him,¹¹ it need not necessarily have altered his view. After all, the common knowledge that an accidentally severed artery pours blood did little to discourage the commonplace view, still held by Erasistratus in the third century BC, that the arteries are air ducts. Watery liquid leaking from a severed eye could likewise have been supposed to have intruded merely as a result of the damage. If, however, as remains possible, Empedocles did acknowledge the existence of transparent humours within the eye (just as he presumably acknowledged, but did not mention, their proper analogue, the air within the lantern), his failure to mention them is quite adequately explained by their assumed lack of an active role in seeing. He may, for instance, have thought them merely the reservoir from which the lachrymal fluid was drawn.¹²

Third, even Alcmaeon, who did practise dissection, attributed vision partly to the agency of the *external* water,¹³ because of its reflectivity, and did not mention the internal water.

We have arrived at the following set of correspondences:

lantern-maker	Aphrodite
lantern	eyeball
flame	fire in eye (iris?)
translucent lantern-sides	transparent cornea
wind	moisture on cornea

If this is right, we have vindicated the text of Theophrastus. He has often caused consternation by failing to include any mention of the water in the passage with which I opened:

He says that its inside part is fire, while what surrounds it is earth and air, through which the fire passes, being fine like the light in lanterns.

This has led a number of scholars, following Diels, to reinsert the water by way of emendation. And even those who have resisted emendation have at least had to face the implication that a crucial part of the eye's structure has been somehow

¹¹ Cf. Hipp. *Loc. hom.* 2, 6.280.5-6 L, *Carn.* 17, 8.606.10 ff. L, where accidental lesion is the sole source of knowledge about the eye's internal fluid.

¹² At Plato, *Tim.* 68A, tears seem to come from inside the eye. But at Hipp. *Loc. hom.* 2, 6.278.23-280.1 L the lachrymal fluid comes from the brain (whether *via* the eye is unspecified).

¹³ Theophrastus, *Sens.* 26, ὁφθαλμοὺς δὲ ὄρᾶν διὰ τοῦ πέριξ ὕδατος. Stratton's suggested identification, 'the water that bathes the eye', gives the overwhelmingly obvious meaning, and I remain puzzled why the great majority of interpreters have taken the reference as being to internal water.

suppressed in his account. By contrast, the water outside the eye, however important its role in vision, is not easily thought of as part of the eye's structure, and it would be only natural for Theophrastus to omit it here. On the other hand, his inclusion of earth and air as surrounding the central fire means that they *are* a crucial part of the eye's structure, and it is an easy conjecture that either the earth is the cornea while the air is a putative empty space between it and the iris, or the cornea itself is an amalgam of earth and air. I tend to prefer the latter: the earth would give the cornea its solidity, while the air would add transparency.

We also have the answer to the old problem: if Empedocles explains vision by effluences *entering* the eye, why does he also need to have fire passing out of the eye? We can take our lead from Theophrastus' next words:

The passages are in an alternating arrangement of fire and water, and, of these, it recognises light things with those of fire and dark things with those of water; for each type fits into each. And the colours travel to the organ of vision by means of effluence.

If water cannot get into the eye but fire can get out, this mixture of passages of water and fire must take place on the surface of the cornea. That is why fire has to pass out of the eye, to mix with the water on its outer surface. The idea that it is the reflective surface of the eye that is responsible for vision can be paralleled in Hippocratic writings,¹⁴ and is reported by Theophrastus to be commonplace (*Sens.* 36).¹⁵ It is a natural assumption to make, not only because of the small reflected image visible in the pupil, but also because what we see appears to be outside our eyes.

It contains, besides, more than a grain of truth. The surface of the cornea is in fact the most important refractor in the eye. An eye deprived of lachrymal fluid has its vision more seriously impaired¹⁶ even than an eye with no lens. Given the likelihood that Alcmaeon's and Empedocles' medical experience had made them familiar with such diseases as trachoma, their emphasis on the lachrymal fluid's crucial role in vision is entirely in place.

But what actually happens in the mixture of water-passages and fire-passages on the eye's surface? According to Theophrastus (*Sens.* 500,25-7 Diels), the passages

¹⁴ Cf. Hipp., *Carn.* 17, 8.606 L.

¹⁵ Alcmaeon (Theophrastus, *Sens.* 26) not only shares this view, but also seems to anticipate Empedocles in invoking water plus fire as the agents of the eye's reflectivity. Having mentioned the eye's external water and the internal fire, he goes on to attribute the reflectivity by which the eye sees to 'the shining and the transparent', presumably referring to the fire and the water respectively.

¹⁶ 'Dry eye-diseases' (ὀφθαλμῖαι ξηραί), to use the generic name from the Hippocratic treatises (*Aer.* 10, *Aph.* 3.12, 14). Cf. Hipp. *Loc. hom.* 2, 6.278.23-280.2 L: when the supply of reflective moisture to the eyes dries up, the sight is quenched.

of water receive dark effluences, those of fire light effluences. These are the effluences which neither bounce off because too fat nor slip right through because too thin (*Sens.* 500,20-3 Diels; Plato, *Meno* 76C-D). Instead of escaping in either of these ways, they 'fit into' (ἐναρμόττειν) the passages, and thus, we must take it, cumulatively build up a picture on the eye's surface.

According to Theophrastus' report of the theory at chapter 8, daysighted animals have not got enough fire in their eyes to produce an even balance of fire and water; so they need fire from outside, i.e. daylight, to make up the balance. Nightsighted animals have too much fire in the eye, and so need darkness (= water) from outside to even the balance. Empedocles has thus turned the old belief about fire in the eye into a handy explanation of the role of light in vision.

At this point it seems appropriate to stand back and evaluate Theophrastus' presentation of the Empedoclean doctrine of vision. If my general reconstruction is right, he has done rather well. He has, for example, not followed Aristotle's mistake¹⁷ of conflating it with Plato's visual ray theory in the *Timaeus*. Nor does he omit any important functional part, such as internal water, in his brief but adequate summary of the lantern passage. If his account is to make overall sense, I have argued, it must be locating the seeing process at the surface of the eye, and the only serious ground for complaint is his failure to make this fact explicit. But even here, given the widespread currency of the assumption that the eye sees thanks to its reflectivity, it is unlikely that ancient readers were misled in the way that modern ones have been.

II. LIKE BY LIKE

In his critical section on Empedocles (12-20), Theophrastus asks some extremely pertinent questions. For example, what is there in the passages before the effluences enter them (13-14)? Not void, at least, he points out, since Empedocles denies its existence. I doubt if any of the objections are unanswerable, however. Empedocles might reply to the challenge about void by insisting that even a closed eye is seeing something, namely darkness, i.e. has its passages filled with dark effluences. This would be a natural extension of Parmenides' thesis (Theophrastus, *Sens.* 4) that even a corpse perceives something, viz. cold, dark and silence.

However, my object here is not to discuss the merits of Theophrastus' objections in general, but to focus on one strand that runs through them. This is the complaint that Empedocles fails to live up to his own principle that perception is of like by like. Here are the main instances:

(*Sens.* 13) Empedocles has not allowed any difference between external fire and 'the fire in the animal', such that the former is seen by the latter but not vice

¹⁷ Aristotle, *Sens.* 437b9-438a5. Cf. O'Brien, and KRS p. 310n.

versa. The relation between them—that of 'fitting in' or likeness—would normally be a reciprocal one.

(*Sens.* 15) When it actually comes to it, Empedocles talks not of likeness but of commensurateness of effluences to passages, and does not go on to specify any further (οὐδὲν ἔτι προσεφώρισεν) whether in cases of commensurateness any kind of actual resemblance obtains.

(*Sens.* 16) Pain is a kind, or concomitant, of perception, yet Empedocles makes pain the result of opposites. So perception is not all of like by like.

(*Sens.* 17) If, in the eye, fire and water perceive what is *like* them, these must be light and dark respectively. Then with what does it perceive grey and other 'mixed' colours?

(*Sens.* 19) 'Like' is too loose a term to be helpful. You don't need to have a smell already in your nose in order to perceive a smell. On the contrary, it makes it harder. A similar objection applies in the cases of hearing and taste.

All these objections depend on Empedocles' being somehow committed to a like-by-like doctrine of perception. What, then, is Theophrastus' evidence that he was? The letter of Theophrastus' own text suggests to me that neither with regard to specific sense-objections nor as a general principle did Empedocles announce any such commitment.

First, Theophrastus effectively concedes at 15 that Empedocles did not discuss the elemental composition of the various effluences, thus leaving it unclear how far, if at all, they resembled the composition of the receiving organs.¹⁸ And we can work out for ourselves that, since the eye's component earth plays no direct part in seeing comparable to the roles of fire and water,¹⁹ unless external earth is to be invisible its effluences must be commensurate with passages of either fire or (more likely) water. So here at least there will be *no* elemental likeness between the effluence and the substance whose passages receive it. The mere 'fitting in' of effluences to passages in the sense organs is clearly an inadequate ground for inferring that perception is of 'like by like'.

Second, Theophrastus in section 10 makes it pretty clear what his textual warrant is for attributing to Empedocles the general principle that all perception involves 'fitting in', and hence is of like by like. It is the passage of five lines from which every ancient source quoted when attributing a like-by-like doctrine to Empedocles:²⁰

¹⁸ Only one source, Aetius 1.15.3 (see 31 A 92 DK) correlates all four elements with specific colours, and this may simply derive from too literal a reading of B 71 (cf. Diels p. 222, O'Brien p. 164). However, for anyone accepting the Aetius evidence at face value, my next comment is pertinent.

¹⁹ Cf. also O'Brien p. 164.

²⁰ See the many context passages listed by Wright in the note to her fr. 77, pp. 123-4. That the two fragments are continuous is strongly suggested by Theophrastus' own comment in *Sens.* 10, and is accepted as probable by Wright.

γαίῃ μὲν γὰρ γαίαν ὁπώπαμεν, ὕδατι δ' ὕδωρ,
 αἰθέρι δ' αἰθέρα διον, ἀτὰρ πυρὶ πῦρ αἰδηλον,
 στοργὴν δὲ στοργῇ, νεῖκος δέ τε νεϊκεῖ λυγρῶ. (B 109 = 77 Wright)
 ἐκ τούτων (γὰρ) πάντα πεπήγασιν ἁρμοσθέντα
 καὶ τούτοις φρονέουσι καὶ ἥδοντ' ἢδ' ἀνιώνται. (B 109 = 78 Wright)

For it is with earth that we see earth, with water water, with air divine air, with fire destructive fire, with love love, and with grim strife strife. For all are constructed and fitted together out of these, and it is with these that they think and feel pleasure and pain.

Now it is very nearly certain that Empedocles is here explaining the combination of elements that makes up the blood which in turn constitutes the seat of thought. Each element in the blood 'sees' its like, but in the sense of grasping or comprehending it, rather than literally seeing it. It has often been pointed out that in the case of the motive forces Love and Strife, at least, literal seeing would scarcely make sense here.²¹

Theophrastus, who himself quotes the last two lines verbatim in section 10, at times seems aware that the passage deals with thought and feeling rather than sense-perception. At least, it is clearly his direct source for the attribution to Empedocles of a like-by-like treatment of pleasure, pain and thinking or intelligence (9-10).

Nevertheless, Theophrastus elsewhere seems determined to extend the same principle to the individual senses. And the word that is evidently doing most of the work for him is ἁρμοσθέντα in the penultimate line, coming as it does hot on the heels of the like-by-like theme. This word is standardly, and with obvious justification,²² taken to mean 'fitted together', describing the elemental blending of the components of blood. Theophrastus, on the other hand, reads it as alluding to the fitting (ἐναρμόττειν) of effluences into the passages of the sense organs. And he leans on it as the term with which Empedocles seeks to convey the likeness relation between sense and sense-object. Thus at the end of 13, having already quoted the lines in question (10), he says

δῆλον γὰρ ὡς ἐναρμόττει, καθάπερ φησί, τὸ ὅμοιον.

For it is clear that what 'fits in', as he puts it, is that which is like.

And shortly after, in 15, he develops one objection with the following remarks:

²¹ Cf. B 17.23 DK. Aristotle, *Met.* 1000b3-9, limits himself to ἡ δὲ γνῶσις τοῦ ὁμοίου τῷ ὁμοίῳ. But Theophrastus may have extended the significance of this by combining it with Aristotle's remark (*Met.* Γ 5, 1009b12-15, taken up by Theophrastus at *Sens.* 25) that the Presocratics do not distinguish thought from perception.

²² Wright aptly supplies the parallels of B 71, 75, 86 DK.

ἔτι δὲ εἰ καὶ μὴ ἐναρμόττοι τὸ ὅμοιον, ἀλλὰ μόνον ἄπτοιτο, καθ' ὅτι οὖν εὐλογον αἰσθησιν γίνεσθαι· δυοῖν γὰρ τούτοις ἀποδίδωσι τὴν γνῶσιν, τῷ τε ὁμοίῳ καὶ τῇ ἀφῇ, διὸ καὶ τὸ “ἀρμόττειν” εἴρηκεν· ὥστ' εἰ τὸ ἔλαττον ἄψαιτο τῶν μειζόνων, εἴη ἂν αἰσθησις.

Furthermore, even if that which is like did not fit in but only made contact, it is reasonable that perception should take place anyhow. For he attributes recognition to two things, namely likeness and contact—which is why he uses the word ‘fit’. Hence if that which is smaller made contact with things bigger than itself, there would be perception.

There are points that I find obscure in this criticism.²³ But for my present purposes it is enough to notice that it is the verb ἀρμόττειν which Theophrastus is taking to indicate Empedocles' view of the relation between any sense-object and the relevant sense-organ, and that he treats this as at least *including* the notion of likeness. We have also noted that in reality the occurrence of the verb in the lines quoted has nothing at all to do with sense-perception, let alone with likeness.

Thus the conflation of the fitting-in model with a like-by-like principle may be no more than Theophrastus' own false construal of B 109. That ‘fitting in’ is indeed the operative notion at least for *vision* we have seen.²⁴ But the evidence which I have aired could raise the suspicion that Theophrastus may have had no better than the spurious warrant of B 109 for his often repeated claim that, for Empedocles, *all* perception depends on ‘fitting in’ and involves likeness. Certainly Theophrastus' exiguous report on the workings of the senses other than vision (*Sens.* 9) does nothing to weaken that suspicion.

In view of all this, and of the apparent unavailability to our ancient sources of any verbatim fragment in which Empedocles actually spoke of likeness as the basis of sense-perception, we must retain some doubt as to how far Empedocles even intended to adopt any such principle.

The trouble seems to be that Theophrastus is the prisoner of an over-schematised doxographical view, according to which Empedocles has *got* to come out as a like-by-like theorist. This unhappy state of affairs is confirmed by the shape of the whole first part of the treatise (1-58). He opens with a confident announcement:

Concerning perception, the majority of general doctrines fall into two kinds. Some people make it due to what is like, others to what is opposite.

²³ I think Theophrastus is saying: since the ‘fitting’ relation invoked in perception combines likeness with contact, why shouldn't *any* case of contact produce perception? If so, he is muddling conjunction with disjunction.

²⁴ This is confirmed by Plato, *Meno* 76C10, ἀρμόττειν.

But it immediately transpires that actually only Anaxagoras and Heraclitus fall into the 'opposites' group, and that, even of these, only Anaxagoras has any specific teaching on the matter (27-37). Hence when Theophrastus turns to the second group, at 25, they have become 'those who do not make perception due to likes'—a catch-all expression which enables totally heterogeneous theories like those of Alcmaeon, Clidemus and Diogenes of Apollonia to be thrown in along with Anaxagoras'. Even then, Diogenes *could* be thought to hold a like-by-like view, he says (39). And Democritus gets his own heading (49), as interpretable either way.

Detailed discussion of the like-by-like group itself starts abruptly in section 3 (499,1 Diels). Parmenides is comfortably enough placed in it (3-4),²⁵ but he has nothing to say about the individual senses. Then follows Plato (5-6), whose accounts of seeing and hearing in the *Timaeus* are drastically condensed into a few lines. On seeing, Theophrastus says:

Vision he makes of fire. (That is why he also makes colour a kind of flame coming from bodies, having its parts commensurate with vision—on the ground that effluence occurs and they must fit into each other.)²⁶ It passes out of the eye for a certain distance and coalesces with the effluence, and that is how we see.

I shall by-pass the general question how far this summary distorts the Platonic account, and just make one point, germane to my present topic. In the *Timaeus* (45C) like-by-like is invoked only as the relation which enables the fiery visual ray to coalesce with *daylight*. This produces a homogeneous visual medium external to the eye, along which any colliding object transmits motions through the eyes to the soul. Only much later (67C-D) does it transpire that colour is itself a kind of flame streaming from objects, and Plato makes no comparable effort to bring out the like-by-like relation of colour to vision. Theophrastus' parenthesis is not strictly speaking a report of Plato, but his own explanation, in terms of the like-by-like principle, of why Plato, having made vision consist of fire, did the same for its object, colour. At the same time, he altogether omits the role of light—the aspect to which Plato himself chooses to attach the like-by-like principle. Thus we can see him selecting in such a way as to confirm his classing of Plato as

²⁵ The qualification at 500,1-6 Diels, ὅτι δὲ καὶ τῷ ἐναντίῳ καθ' αὐτὸ ποιεῖ τὴν αἴσθησιν, is not a concession that Parmenides has one foot in the 'opposites' camp, but a partial restriction of the earlier assertion (499,16-17 Diels) that perception depends on a *ratio* between two opposite elements. In the special case of a corpse, it is exclusively (καθ' αὐτό) the cold dark element that perceives; but it still of course perceives its own like.

²⁶ The text printed by Diels and Stratton is ungrammatical, as far as I can see, and I have repunctuated in order to remedy this. The new sentence which I make starts at 500,11 Diels; a connective probably needs to be supplied, e.g. ἐξιοῦσαν (δὲ) μέχρη.

holding a like-by-like theory of vision. I doubt if that schematisation is an altogether unjust one. But it is instructive, and cautionary, to see how it helps determine the emphases in Theophrastus' doxographical report.

What motivates Theophrastus to tie his hands in this way? The answer, I think, is his Aristotelianism. Aristotle's own schematisations of earlier thought are well known to reflect his view of it as groping towards the truths he has himself established. Dealing with nutrition in *De anima* 2.4, 416a29-b9, Aristotle classifies his predecessors into those who say that it is of like by like and those who say that it is of opposite by opposite. He then produces his own characteristic synthesis of the two views: both parties are half right, because food is unlike before digestion, but like after digestion.

Aristotle is apparently referring back to this passage a little later, at 2.5, 417a18-20, where he is dealing with the general character of perception:

Hence in a way the action is by that which is like, in another way by that which is unlike, as we said. For that which is unlike is acted upon, but once acted upon it is like.

But Aristotle is wise enough this time not to tie his synthesis to an explicit doxographical schema.²⁷ He does *not* say 'Some hold that perception is by likes, others by opposites.' We have, indeed, learnt by now how difficult it is to divide pre-Aristotelian theories of perception into two such neat groups.

Theophrastus, it seems, was incautious enough to step in and remedy the omission.²⁸

²⁷ Even Aristotle's rather sweeping remarks about 'the ancients' as holding a like-by-like view of perception, at *DA* 427a21-9, imply nothing nearly as precise as Theophrastus' schema—even though it may well be the passage which Theophrastus took as his warrant for classifying Empedocles as he does (just as he may rely on *ibid.* 404b16-18 for Plato).

²⁸ Theophrastus' cautionary remark at 31 about whether perception really is an ἀλλοίωσις reflects a concern with Aristotle's arguments in this same chapter (2.5) of the *De anima*.

3

Theophrastus on the Intellect

Daniel Devereux

There is a superficial similarity between Theophrastus' remarks on the intellect and his brief work on metaphysics. In both, he is chiefly concerned with specific doctrines of Aristotle, and the character of his discussion is for the most part aporetic. The way in which the *aporiai* are treated, however, is interestingly different in the two cases. In the *Metaphysics* it is clear that Theophrastus is genuinely skeptical in regard to a number of important Aristotelian views; he regards his *aporiai* as posing the sort of difficulties that call for major revisions, not minor adjustments.¹ The *aporiai* concerning Aristotle's theory of the intellect, on the other hand, are not seen as posing serious challenges; they are used as a way of clarifying the difficult and obscure discussions in *De Anima* (DA) III 4 and 5. Virtually every question raised receives an answer, or at least a suggestion of an answer. And Theophrastus' suggestions seem to be neither departures from, nor developments of, Aristotelian views, but rather reformulations of those views with the aim of clarifying what Aristotle had in mind in a particular passage. It is sometimes thought that the main purpose of Theophrastus' remarks is to raise difficulties about a number of Aristotle's claims, and that any clarification provided along the way is incidental. My view of his aim is quite different; I see him as trying to anticipate the sorts of misunderstandings and questions a reader is likely to have as he feels his way through the maze of Aristotle's discussion of the "passive" and "productive" intellect²—a guide for the perplexed reader of DA III 4 and 5. The argument for my view will consist of an examination of several of the fragments, indicating in particular cases how Theophrastus' *aporiai* are designed not so much to challenge as to clarify Aristotle's views. If clarification was indeed his aim, then we have

¹ See, e.g., *Metaphysics*, 7b 5-8, 8a 8-10, 11b 24-12a 2.

² I will avoid speaking of the "active" or "agent" intellect since these are not terms that Aristotle actually uses in III 4 and 5. For helpful remarks on the terminology used in discussing the intellect in Aristotle, Theophrastus and the commentators, see Pamela Huby, "Stages in the Development of Language about Aristotle's *Nous*", in *Aristotle and the Later Tradition*, ed. H. Blumenthal and H. Robinson, Oxford 1991, 129-143.

all the more reason to look to these fragments for help in deciphering Aristotle's cryptic messages concerning the intellect.

I

I will begin by clearing up what I take to be a misunderstanding of the structure of Aristotle's discussion in *DA* III 4 and 5. In his book, *La théorie aristotélicienne de l'intellect d'après Théophraste*, Barbotin assumes that chapter 4 focuses on the passive intellect, and that it is only in chapter 5 that Aristotle turns his attention to the "productive" intellect. He thus takes whatever is said about *nous* in chapter 4 to apply to passive rather than productive *nous*. In this view of the division of contents between chapters 4 and 5, Barbotin seems to be following Themistius.³ In his discussion of Theophrastus' fragments, Barbotin—again following Themistius—naturally takes those dealing with passages in chapter 4 to be concerned exclusively with the passive intellect. This leads him, for example, to interpret Theophrastus' mention of *nous* as the "principle of all" (*archên pantôn*) in Fragment I^b 4 as a characterization of passive *nous*, and he then goes to heroic lengths in an attempt to explain how passive *nous* must somehow contain within itself the principle or cause of its actualization. However, it is quite clear that in answer to the question, What is the principle or cause responsible for the actualization of passive intellect?, both Aristotle's and Theophrastus' answer is productive intellect.⁵ It thus seems to me that we have good reason to suppose that this particular remark in I^b is not meant to be a characterization of passive *nous*.

What we see in the first three fragments of Theophrastus (I^a, I^b, and I^c) is the same movement of thought that we find in *DA* III 4 and 5. Both authors begin by attributing various characteristics to *nous* without specifying whether they are referring to productive or to passive *nous*. Then there is a move (in I^c in Theophrastus, in III 5 in Aristotle) to clarify the discussion by distinguishing between productive and passive *nous*, and indicating which attributes belong to each. Theophrastus indicates the need for a distinction between productive and passive *nous* by formulating questions designed to make one wonder how the various descriptions of *nous* can be true of one and the same entity: e.g. how something

³ See *La théorie*, 252, 270 for Themistius' view of the division of contents between III 4 and III 5. In his Ch. III Barbotin discusses various problems in *DA* III 4, and it is pretty clear that he regards all of these as pertaining exclusively to the passive intellect; see, e.g., pp. 116, 125, 135, and compare the titles for Ch. III ("L'intellection et la nature de l'intellect en puissance") and Ch. IV ("L'intellect actif, son rôle, ses rapports avec l'intellect en puissance").

⁴ I will be citing the fragments according to Barbotin's numbering, which is the same as Hicks's (*Aristotle, De Anima*, 589-96) except that Barbotin subdivides Fragment 1 into three sections, I^a, I^b and I^c.

⁵ See Fragments VI, XII.

whose nature is to be nothing in actuality but everything in potency could at the same time be the principle or cause whereby this potency or power is actualized. He then introduces the distinction, indicating that the first description ("nothing in actuality, everything in potency") applies to passive (or potential) *nous* but not to productive *nous*, while the second applies to productive but not to passive *nous*.⁶

Aristotle does not explicitly indicate that part of the aim of chapter 5 is to clarify what has been said in chapter 4, but a comparison of the two chapters makes it pretty clear that that is what he is doing.⁷ In chapter 4, his references to *nous* are never qualified as productive, active, or passive. He begins the chapter by suggesting that if thinking is like perceiving, then *nous* will have the same sort of relationship to its objects, the *noêta*, that the faculty of sense has to sensible objects. *Nous* will be acted upon in some way by its objects; but it must at the same time be impassible (*apathês*) for the same reason that the faculty of sense is *apathês*.

If we bear in mind the distinctions made in chapter 5, we can easily see that the observations at the beginning of chapter 4 do not concern productive *nous*, nor do they concern *nous* understood as the complex of productive and passive *nous*; they apply exclusively to passive *nous*.⁸ (429a 21-22: "... hence it has no other nature than this, that it is a capacity.") But it also becomes clear that not everything that Aristotle says about *nous* in chapter 4 can be applied to passive *nous*. When *nous* is thinking, we must understand this activity, according to chapter 5, as involving the joint operation of passive and productive *nous*; and chapter 4 does discuss *nous* as engaged in thinking (429b 3-4). Since the activity of thinking does not depend on the body—at least not in the way that sense perception does—Aristotle infers that *nous* is separable, i.e. can exist or function apart from the body (429b 4-5).⁹ This particular comment about *nous* evidently cannot apply to passive

⁶ It would be more accurate to say that Theophrastus introduces the distinction in I^c in a way that implies that once the distinction is grasped, the foregoing difficulties (at least some of them) will be cleared up. He leaves it to the reader to see that some of the descriptions apply to productive *nous* while others apply to passive *nous*.

⁷ The same relationship can be seen in the *Post. Analytics* between II 10 and II 8-9; see DeMoss and Devereux, "Essence, Existence, and Nominal Definition in Aristotle's *Posterior Analytics* II 8-10," *Phronesis* (1988); pp. 150-3.

⁸ An exception to this would seem to be the characterization of both passive and productive *nous* as *apathês*: cf. 429a 15 with 430a 18, 24. However, in the passage in III 4 (429a 15) it is clear that what Aristotle means by saying that the (passive) intellect is *apathês* is that it is unaltered in intellection in the same way that the perceptive faculty is unaltered in perception (see 424a 7-10, and Hicks on 429a 15); he is not suggesting that the passive intellect is *apathês* in the stronger sense that it is indestructible. It is this latter, stronger sense that Aristotle seems to have in mind when he applies the term to the productive intellect for he connects it with the productive intellect's immortality. (The words *hoti touto men apathês*, in 430a 24, I take to give the reason for productive intellect being immortal and eternal (a 23), and not the reason for its not remembering.)

⁹ It might be thought that the passage is concerned with passive intellect, and that

nous, for according to chapter 5 only productive *nous* is separable; passive *nous* is perishable and ceases to exist when the human being dies (430a 24-25). So some of the things said about *nous* in chapter 4 are true of productive but not of passive *nous*, while other things apply exclusively to passive *nous*. And the reason the discussion is unclear is that Aristotle has not yet explained that there are two distinct sorts of *nous* in the soul.

As I mentioned earlier, it is important to understand the similar movement of thought in Aristotle and Theophrastus from observations about unqualified *nous* to the distinction between the two kinds of *nous* and the retrospective clarification this provides; otherwise we may assume, as Themistius seems to have done, that since the beginning of chapter 4 clearly deals with the passive intellect, and since there is no explicit mention of the productive intellect in the chapter, the entire chapter is devoted to passive *nous*. The result of such an assumption will be difficulties like the one we have already noticed.

II

Let us now take a look at some of Theophrastus' fragments to see how they clarify points in Aristotle's discussion. In several places he seems to pick out statements of Aristotle's that could easily be misunderstood, and tries to give them their proper sense. Consider, for example, the following lines from I^a:

Τὸ μὲν γὰρ μηδὲν εἶναι κατ'
ἐνέργειαν, δυνάμει δὲ πάντα, καλῶς, ὥστερ
34 | καὶ ἡ αἴσθησις. Οὐ γὰρ οὕτως ληπτέον ὡς P 25, 28
35 οὐδὲ αὐτός (ἐριστικὸν γάρ)· | ἀλλ' ὡς ὑποκει-
μένην τινὰ δύναμιν καθάπερ καὶ ἐπὶ τῶν
36 ὑλικῶν.

The statement that it is nothing actually, but everything potentially, is well put, as is also the case with sense. For it should not be taken in this way, that it is not even itself—for that would be eristical—but rather as a certain underlying potentiality, as also in the case of material objects.

The statement or view that Theophrastus alludes to is found in chapter 4 where Aristotle says that the nature of *nous* is to be a potency, and as a mere potency it is nothing actually (*energeiai*); it is potentially all things since it is a potency

what Aristotle means by saying that it is *chôristos* is just that it is "separable in thought," not that it can exist on its own (cf. 429a 10-12). But Aristotle seems to regard the passive intellect as dependent on the body in such a way that its 'operation' could not be conceived apart from the body; cf. 430a 24-25.

to think all things (cf. 429a 18), and in thinking things it becomes in a way identical with those things. Theophrastus approves of this statement, but he believes there is a way of taking it which would be a mistake—would be “eristical”, as he says. Presumably he is referring to the eristical practice of taking a term or statement in a sense not intended by the speaker.

What is the particular misconstrual that Theophrastus has in mind? The text as it stands does not yield a meaning very relevant to the context. Huby’s translation is: “For it must not be taken in this way, that it is not even itself” (*houtōs ... hōs oude autos*). The implication is that one might—mistakenly—take Aristotle’s statement as a denial of the self identity of *nous*. I suppose one could understand the words “it is nothing actually” as implying that it is not even itself, but this does not seem to fit the context very well. If the *oude* were changed to *ouden*, I think we would then have a misconstrual that is more appropriate to the context. The translation would be: ... “it should not be taken in this way, that it is nothing.” Aristotle says of *nous* that “it is nothing *kai’ energeian*”; someone might mistake his meaning and suppose he is saying that it is simply nothing—a non-entity. Theophrastus explains that it is not a non-entity but a certain underlying power which might be compared to the underlying potency or matter of a material object. Such matter, as mere potency, is nothing *kai’ energeian*; but it is not therefore a non-entity.

Another passage in which Theophrastus attempts to clarify Aristotle’s meaning is Fragment I^c.

6	Τάχα δ' ἂν φανείη καὶ τοῦτο ἄτοπον εἰ ὁ	P 26,1-2
7	νοῦς ὕλης ἔχει φύσιν μηδὲν ὦν ἅπαντα δὲ	
	δυνατός. Οὐχ οὕτω δὲ ληπτέον οὐδὲ πάντα	3
	νοῦν, ἀλλὰ δεῖ διελεῖν. Ποῖος οὖν καὶ	4
	τίς ἡ διαίρεσις; Ἡ μὲν γὰρ ὕλη οὐ τόδε	
	τι, ὁ δὲ νοῦς εἰ μὴ οὕτω, τί ἂν ἕτερον;	5
	Κατὰ ἀναλογίαν οὖν καὶ τὸ δυνάμει ληπτέον	
	ἐπὶ τοῦ φυχικοῦ νοῦ· ὥς γὰρ πρὸς τὸν	6
	ἐνεργεῖαν νοῦν.	

But perhaps this [the hypothesis that *nous* is the *archē* of thinking] too would seem strange, if the intellect has the nature of matter, being nothing, but potentially all things. But it should not be taken in this way, nor of all intellect, but it is necessary to distinguish. Of what sort, then, and what is the distinction? For, on the one hand, matter is not some “this,” but if the intellect is not like this, what else would it be? We must take the potential—in regard to the intellect of the soul—according to an analogy; for it must be taken in relation to the intellect in activity, that is, the one that is separate.

The passage begins by pointing out that it would be strange if, according to the hypothesis entertained in the preceding passage, *nous* were the *archê* of thinking, but at the same time had the nature of matter, "being nothing, but potentially all things." How can *nous* have both of these apparently opposite characteristics? In his response, Theophrastus makes two points: "it should not be taken in this way, nor of all *nous*." Again he warns us against a possible misconstrual of Aristotle's words. It seems pretty clear that it is the same misconstrual; i.e. we should not take the words "being nothing (*mêden on*), but potentially all things" to mean that *nous* is a non-entity. Nor should we take the statement that *nous* has the nature of matter as applying to *all nous*; the implication is that there is another sort of *nous* of which this description is not true. "It is necessary to distinguish": in other words, we must distinguish between the *nous* having the nature of matter and another kind of *nous*.¹⁰ Theophrastus proceeds to do this in the following lines, separating *to dunamei epi tou psuchikou nou* from *ho energeiai nous*.¹¹ In the fragment we have, he does not go on to show how, once this distinction is made, there is no longer a problem in seeing how *nous* can have the nature of matter and at the same time be an *archê* of thinking. Whether or not he spelled out the solution in his original discussion, it is easy enough for the reader to see how the distinction clears up the difficulty.

III

If thinking is understood according to the model of sense perception, that which activates thought should be the *noêta*, the objects of intellect, just as sensible objects activate the faculty of sense perception. But as Aristotle notes, there is an important

¹⁰ I take the words *oude panta noun, alla dei dielein* to mean: "[what was said] does not apply to the whole intellect, but a division must be made." In other words, a division between parts of the intellect will be made which will enable us to see to which part of the intellect the foregoing remarks apply. Then Theophrastus says: *Poios oun kai tis hê diairesis*; Barbotin translates: "Quelle est donc la nature de l'intellect, quelle est cette distinction?" (251). It seems to me better to take the *poios* as picking up *oude panta noun*; in other words, "which part (or "which sort") of the intellect [do the foregoing remarks apply to], and what is the division?"

¹¹ Barbotin (and Priscian—see p. 262) takes the words *hê men gar hulê ou tode ti, ho de nous ei mê houtô, ti an heteron*; to imply that the passive intellect is a *tode ti* and is not like matter in this respect. This seems to me problematic. For according to *DA* III 4 the nature of the passive intellect is to be a potency, and Aristotle holds that the matter of a thing, or a potency, is not a *tode ti*—only the actual thing or the form is a *tode ti*. I wonder if it might be possible to construe these words as follows. The words *he men* mark the beginning of the division of *nous* into parts; one part is [like] matter and is not a *tode ti*—"nous, if it is not like this, what other could it be?" In other words, at least this much is clearly true of the intellect—that it is a passive potency, like matter, and not a *tode ti*. In the next lines Theophrastus turns to the other part of *nous* (*ton energeiai nous*).

difference between the two; for we can think of intelligible objects whenever we wish, whereas in the case of perception we must be in the presence of the sensible objects. The activation of thought depends on us in a way that it does not in sense perception. It becomes clear in III 5 that intelligible objects by themselves are not sufficient to actualize the capacity to think; the productive *nous* has an important role to play in this process. It is not clear from chapter 5, however, exactly what the respective roles of productive *nous* and the objects of *nous* are in thinking. Is productive *nous* directly responsible for thought by its action on the passive *nous*? This might seem plausible in view of Aristotle's comparison of productive intellect to an artist working on his material (430a 10-14). Or should we take as our guide the comparison of productive *nous* to light, the function of which is to bring into actuality the objects of *nous*, the *noêta*? Once these objects become actualized, they then activate the passive *nous* and thus bring thought into existence. I believe we can glean from Theophrastus' remarks where he stands in regard to these questions. This is important for he of course had much more evidence regarding Aristotle's position than we do. Let us look first at Fragment 1b.

- | | |
|--|--------------------------|
| <p>1 Πῶς δέ ποτε γίνεται τὰ νοητὰ καὶ τί τὸ πάσ-
 2 χειν (ὑπ') αὐτῶν; Δεῖ γάρ, εἴπερ εἰς ἐνέργειαν
 3 ἤξει καθάπερ ἡ αἴσθησις. Ἀσωμάτῳ δὲ ὑπ'
 4 ἄσωμάτου τί τὸ πάθος ἢ ποία μεταβολή;
 5 Καὶ πότερον ἀπ' ἐκείνου ἢ ἀρχῇ ἢ ἀπ' αὐτοῦ;
 6 Τῷ μὲν γὰρ πάσχειν, ἀπ' ἐκείνου δόξειεν ἄν
 (οὐδὲν γὰρ ἀφ' ἑαυτοῦ τῶν ἐν πάθει)· τῷ δὲ
 ἀρχὴν πάντων εἶναι καὶ ἐπ' αὐτῷ τὸ νοεῖν,
 καὶ μὴ ὥσπερ ταῖς αἰσθήσεσιν, ἀπ' αὐτοῦ.</p> | <p>P 27, 8</p> <p>14</p> |
|--|--------------------------|

And in what way does it (*nous*) become the intelligibles, and what does its being affected by them consist in? For it must be [affected by them] if it is going to come into activity, like sense. But what effect—or what sort of alteration—is produced by an incorporeal thing on an incorporeal thing? And is the principle (*archê*) from that [the intelligibles] or from [the intellect] itself? For in view of its being affected it would seem to be from that—for none of the things being affected [derives its being affected] from itself—but in view of its being the principle of everything and thinking being in its power, and not as with the senses, [it would seem to be] from itself.

Once the distinction between productive and passive intellect is made (in I^c), it becomes clear—and I think Theophrastus means it to become clear—that the *nous* that might be the principle or starting point of intellection would be productive. So we are presented with two possibilities: either the intelligibles that somehow

act on the intellect are the principle of intellection, or the intellect itself, in the form of productive intellect, is the principle. It is interesting to note that the question whether the intelligibles are the principle of intellection is independent of whether they somehow act on the intellect. For it is assumed that they *do* act in some way or other, and then the question is raised whether they are the principle responsible for intellection.¹² In Fragment VI Theophrastus seems to opt for the view that intellect itself is the principle, and speaks of the active or “moving” (*kinōn*) intellect in this connection. Thus he holds both that the intelligibles act on the intellect and thereby bring it “into activity,” and that productive (or “moving”) intellect is the principle or starting point of intellection. Are these two views consistent? A look at Fragment VIII will help us to see how they might be.

- 31, 8-9 Ὅταν γὰρ οὕτως ἕκαστα γένηται ὡς ἐπὶ|στήμων
κατ' ἐνέργειαν λέγεται, τοῦτο δὲ συμβαίνειν φαμέν
10 ὅταν | δύνηται δι' ἑαυτοῦ ἐνεργεῖν, ἔστι μὲν οὖν
11 καὶ τότε δυνάμει πῶς, | οὐ μὴν ὁμοίως καὶ πρὶν
12 μαθεῖν καὶ εὐρεῖν. Ὑπὸ τίνος οὖν ἡ | γένεσις καὶ
πῶς, εἴτ' οὖν ἕξεως καὶ δυνάμεως εἴτε οὐσίας;
13 | Ὅεικε δὲ μᾶλλον ἕξεως, αὕτη δὲ οἶον τελεοῦν τὴν
φύσιν.

When it [the intellect] becomes each thing, in the way that a person is said to be a knower in actuality—and we say this happens when he can activate [his knowledge] by himself—it is then still potential in a way, though not in the same way as before learning and discovering. By what and in what way does this come about [the intellect becoming active], by a disposition or power, or by a substance? It seems rather to be by a disposition, and this is such as to perfect the nature.

When he says that it is by a disposition (*hexis*) that the (passive) intellect is brought into activity, Theophrastus is no doubt alluding to the passage in *DA* III 5 where Aristotle says that productive intellect makes everything, as a sort of disposition (*hexis*), like light. “For in a certain way light, too, makes potential colors into actual colors” (430a 16-17). If the efficacy of productive intellect is understood in this way, we can see how Theophrastus could hold both that (productive) intellect is the principle or starting point of intellection, and that the (passive) intellect is brought into activity by its objects, the intelligibles. The intelligibles must become actualized before they can ‘affect’ the intellect, just as colors must become actual through light before they can affect our vision. What

¹² Cf. Prisc. 27, 32 (Barbotin, 252); 28,16-25 (Barbotin, 256).

actualizes the intelligibles, and thus enables them to affect the passive intellect, is the productive intellect. The immediate cause of passive intellect being actualized is the intelligibles, but the principle or starting point of the process is the active intellect.¹³

This, as I say, seems to be how Theophrastus understands the way intellection occurs, since he holds both that intelligibles are in a way analogous to sensible objects in bringing the (passive) intellect into activity, and also that the productive or “moving” intellect is the principle or starting point of intellection. He does not think of productive intellect operating directly on passive intellect, as might be suggested by the analogy of the artist working on his materials. If we understand Theophrastus to be presenting what he takes to be Aristotle’s doctrine, then we have good reason to suppose that Aristotle, too, held that productive intellect is responsible for intellection in the way that light is responsible for vision.

Perhaps Theophrastus is also suggesting a way in which the artist analogy is appropriate when he says at the end of Fragment VIII that the *hexis* by which the intellect becomes active is “such as to perfect the nature.” The remark is so sketchy it is hard to see what exactly he has in mind; perhaps the “nature” he refers to is the nature of passive intellect.¹⁴ We might then suppose that the passive intellect is perfected, or achieves the fulfillment of its nature, by becoming one with its objects. Insofar as the active intellect is responsible for passive intellect reaching its ‘finished’, fulfilled state, we might think of its work as analogous to the work of the artist who brings his materials to a finished form.

IV

Perhaps the greatest difficulty concerning Aristotle’s doctrine of the intellect is how to understand the relationship between productive and passive *nous*. There is a celebrated debate, going back through the Middle Ages to the ancient commentators, between those who regard the active or productive intellect, even while associated with the human soul, as a separate and transcendent entity, and those on the other hand who regard it as a part of the human soul—immanent instead of transcendent. Barbotin argues persuasively, in my opinion, against the “transcendent” interpretation; by appeal to details of the language used by both Aristotle and Theophrastus, he makes a strong case for the view that both philosophers regarded the productive intellect as existing in the soul as a part.¹⁵ However, Barbotin does not completely reject the transcendent interpretation. Aristotle says in III 5 that in its essence productive intellect is separate and is always

¹³ Cf O. Hamelin, *La theorie de L'intellect d'après Aristote et ses commentateurs* (Paris, 1981 [reprint]), p. 21.

¹⁴ Cf Paul Moraux, “Le *De Anima* dans la tradition grecque”, *Aristotle on Mind and the Senses*, ed. G.E.R. Lloyd and G.E.L. Owen (Cambridge, 1978), pp. 295, 299.

¹⁵ See pp. 205-13.

thinking. According to the immanent view, during the time the active intellect is associated with the human soul it is not separate and its thinking is discontinuous; in other words, the active intellect does not retain its essence during the time it is part of the human soul. But Barbotin argues that, even while it is immanent in the human soul, the active intellect retains its essence: it continues to be a separate entity, engaged in continuous thought.¹⁶

Now it is puzzling how active *nous* could be, as Barbotin suggests, both a part of the soul and, at the same time, separate. Wouldn't its being separate entail that it is not a part of the soul? Be that as it may, I think it is clear that Barbotin's view does not accord with Theophrastus' understanding of the relationship between active and passive intellect. The issue is directly addressed in Fragment XII.

- 108, 22-23 Τίνες οὖν | αὐται αἱ δύο φύσεις; Καὶ τί πάλιν τὸ
 24 ὑποκείμενον ἢ συνηρημένον τῷ | ποιητικῷ; Μικτόν
 γάρ πως ὁ νοῦς ἔκ τε τοῦ ποιητικοῦ καὶ τοῦ
 25 δυνάμει. | Εἰ μὲν οὖν σύμφυτος ὁ κινῶν, καὶ εὐθὺς
 26 ἐχρῆν καὶ αἰεὶ· εἰ δὲ ὕστερον, | μετὰ τίνος καὶ πῶς
 ἢ γένεσις; Ἔοικε δ' οὖν ὡς ἀγέννητος, εἴπερ καὶ
 27 ἀφθα|ρτος. Ἐνυπάρχων δ' οὖν διὰ τί οὐκ αἰεὶ;
 28 Ἦ διὰ τί λήθη καὶ ἀπάτη καὶ | ψεῦδος; Ἦ διὰ
 τὴν μίξιν;

What, then, are the two natures? And what, again, is this which underlies and is subordinate to the productive [*nous*]? For the intellect is somehow a mixture of the productive and the potential. If then the moving [intellect] is innate, it must have been so [i.e. moving] from the start and always. But if it came later, with [the aid of] what, and in what way, was its coming to be? But it seems indeed to be ungenerated, if it is also indestructible. Since, then, it is inherent in [the soul], why is it not always [active]? Why are there forgetting and deception and falsehood? Or is it because of the mixture?

The first point I would like to draw attention to is the fact that the end of this passage makes it pretty clear that Theophrastus does not think that the active intellect, when it is “inherent in” the soul, thinks continuously. After suggesting that the productive or “moving” intellect is not generated and is inherent in the soul from the beginning, he poses the question: Why is it not always thinking? Now he could have responded that it *is* always thinking, but instead he suggests that perhaps it is not always thinking because of the fact that it is mixed with the potential

¹⁶ Pp. 213-15; cf. 164: “...sans être entamé dans son actualité propre—Théophraste le déclare “incorruptible”—l’intellect actif meut une puissance dont l’activité ne peut être qu’intermittente et imparfaite.”

42 Theophrastus

intellect. The suggestion implies that when the productive intellect is 'unmixed' it does engage in continuous thought. So, for Theophrastus at least, it is not true that the productive intellect is always thinking, even when it is a part of the human soul.

As I mentioned earlier, Aristotle holds that continuous thought is part of the essence of the productive intellect. It might seem that Theophrastus disagrees since he holds that continuous thought does not belong to the productive intellect while it is mixed with the passive or potential intellect. However, there need not be a disagreement if there is a fairly close correspondence between Theophrastus' use of the term "mixture" (*mixis*) and Aristotle's. According to Aristotle, when two things are mixed, they undergo an alteration such that they no longer possess "their own nature."¹⁷ But losing their nature does not mean that they are destroyed.

... nevertheless each of them may still be potentially what it was before they were mixed, and both of them may survive undestroyed. (327b 25-26)

If Theophrastus believed that the productive intellect retains its nature or essence when it is "mixed" with the passive intellect, his use of the term "mixture" would be misleading. For his audience would presumably be familiar with the Aristotelian account of "mixture", and would naturally assume that the components of the mixture are changed "out of their own nature" when combined. It seems to me much more likely that Theophrastus meant to suggest that productive and passive intellect do not retain their nature or essence when they are combined and interact with each other.¹⁸ Further, although the passive intellect cannot survive the death of the human being since its existence depends on the body, the productive intellect can "survive undestroyed," and when it is no longer mixed with the passive intellect it will regain its "own nature"—it will then engage in continuous thought. These points, which seem to accord well with what is said in *DA* III 5,¹⁹ are clearly implied by Theophrastus' use of the term "mixture" if, as seems likely, he is following Aristotle's understanding of what a mixture is.

If what we have said is right, Theophrastus seems to subscribe to a clearcut "immanent" view of the relationship between the productive intellect and the human soul. He not only believes that it is part of the soul; he believes that it is fundamentally altered in becoming a part of the soul. Once it becomes part of the soul, it no longer possesses a characteristic that is of its very nature or essence—

¹⁷ *On Gen. and Corr.*, 328a 28-31 (... *metaballei ek tês hautês phuseôs*).

¹⁸ Since the passive intellect "has no other nature than this, that it is a capacity" (*hoti dunaton*, *DA* 429a 21-22), it, too, is changed "out of its nature" when it is mixed with the productive intellect.

¹⁹ Note that Aristotle's use of *chôristheis* at 430a 22 seems to imply that it is only once the active intellect has been separated from the rest of the soul that it possesses its true nature (*esti monon touth' hoper esti*) and thinks continuously.

the characteristic of continuous thought. As a component of a mixture, its mode of existence is not separate. But it is "separable" (*chôristos*) in the sense that it can survive the dissolution of the mixture; and it is only when it has thus been separated that it manifests its real nature.²⁰

Of course Theophrastus' suggestive use of the term "mixture" may not be a reliable guide to Aristotle's understanding of the relationship between productive and passive intellect. But if it is his intention to clarify Aristotle's views in *this* passage, as it seems to be in the others we have discussed, we have strong evidence in favor of what might be called a thoroughgoing immanentist interpretation. His intention to clarify, combined with his privileged access, makes the testimony of Theophrastus of the utmost importance for our understanding of Aristotle's doctrine of the intellect.²¹ I believe that Theophrastus' suggestions about the relationship between the productive and passive intellect are completely consistent with what is said in *DA* III 4 and 5, and throw valuable light on some of the more cryptic statements in these difficult chapters. Attempting to show this by a detailed examination of Aristotle's discussion is beyond the scope of this essay, but I hope I have at least shown that such an attempt is worth the effort.²²

²⁰ See preceding note.

²¹ I am assuming that Theophrastus at least heard Aristotle discuss questions concerning the intellect, if he did not actually engage in discussion with him. For a different view, see Huby, *op. cit.*, n. 2 above.

²² I am grateful to Pamela Huby, my commentator at the Eresos Theophrastus Conference, for interesting and helpful suggestions.

Theophrastus and Aristotle on Animal Intelligence

Eve Browning Cole

Greek philosophy and literature are a rich source of depictions of animal behavior interpreted in light of its contrasts and similarities to human behavior. The purposes served by such comparisons between the animal and human realms are various; sometimes scientific, sometimes illustrative or even comic, sometimes more profoundly part of a project of human self-definition or self-location, of highlighting the specific *place* of human life and society within the larger framework of the life-world in general.¹

Theophrastus marks a fascinating and frustrating juncture in the history of that tradition, for of the work *On the Intelligence and Character of Animals* which Diogenes Laertius attributes to him (5.49), it is questionable whether any texts at all survive. This fact, in light of the great interest of ancient thinkers after Aristotle in animal behavior (especially in bizarre or fantastical tales) and the total absence of ancient citation of the putative treatise by Theophrastus, has led some to doubt that such a work ever existed.²

To compound our frustration, we have the fact that a lively, if rather strangely structured, set of observations and ruminations about animal “intelligence and character” *does* exist, and probably dates from the period during which Theophrastus was actively engaged in such researches—unfortunately, it is contained within a work much of which undoubtedly was penned by Aristotle: the *Historia animalium*. Thus the question of the ascription of *HA* 8 and 9 to Theophrastus has generated

¹ The most wide-ranging study of ancient Greek views on animals’ capacities, in comparison with human capacities, is that of Urs Dierauer, *Tier und Mensch im Denken der Antike* (Amsterdam: Grüner, 1977). An important earlier study, with abundant information on actual practices involving animals such as ritual sacrifice and hunting, is the inaugural-dissertation of Gunther Lorenz, *Die Einstellung der Griechen zum Tier* (Innsbruck: Leopold-Franzens Universität, 1972, unpublished).

² O. Regenbogen, article on Theophrastus in Pauly-Wissowa, *Realencyclopädie*, Supplementband VII, pp. 1354-562.

considerable controversy.³ In the absence of an independent treatise, securely ascribable to either Aristotle or Theophrastus, dealing systematically with animal behavior and intelligence, we are at a loss whether the contents of the relevant portions of *HA* are more doctrinally consistent with one or the other thinker; and are thus thrown back upon necessarily less satisfying considerations, such as stylometrics, or prejudicial preconceptions about Aristotle's superior rigor of argument to that of Theophrastus, etc.

But scholarly curiosity about Theophrastus' general position on the questions surrounding the nature and limits of animal intelligence, the capacity of animals other than humans for engaging in social life, and in *action*, for displaying *moral* qualities, etc., is well-motivated. The author of the *Characters*, containing as it does sketches of human "types" which are delicate, brief, and yet indescribably telling, had an eye for the characterizing detail which could not have failed to produce ethology of the highest quality. The author of the *Historia plantarum* and the *De causis plantarum*, with their unparalleled wealth of accurate botanical information, could not have failed to add richly to the biological information-stores of his contemporaries by means of animal observation.⁴ And the research agenda of the Peripatos, with its energetic collecting and sharing of systematic investigations into all manifestations of nature, must have given Theophrastus both the impetus and the support to do first-class work.

Apart from the disputed sections of the *Historia animalium*, however, there are several relevant passages safely attributable to Theophrastus, and these go some way toward filling in the picture which might have been more fully painted in the missing work *On the Intelligence and Character of Animals*. Before we turn to these, however, let us first sketch a background by surveying the views on animal intelligence and character which we may attribute to Theophrastus' well-known colleague, Aristotle. For these will serve both to define the issues and to establish a dialectical context for Theophrastus' own contributions.

I. ARISTOTLE ON ANIMAL INTELLIGENCE

Some questions which might be expected to interest the inquirer into the intelligence and character of animals are: How sophisticated are the psychic capacities of animals, and by what standard of sophistication? How considerable is the cognitive and psychic "overlap" between animals and humans? Do animals experience emotions? Possess self-concepts? Genuinely learn? How powerful is the force of instinct in explaining animal behavior? Are animals genuinely social,

³ I will make a suggestion about this controversy in my conclusion.

⁴ For a historian's enthusiastic view of Theophrastus' contribution to botany, see George Sarton, *A History of Science*, volume I (Cambridge: Harvard University Press, 1952) pp. 551-8.

or political, in any meaningful sense of those terms? Do animals have distinctive individual "personalities", or merely species-traits? Is animal behavior ever truly purposive? Do animals possess the kind of intrinsic value, or moral respectability, which would warrant moral consideration by humans? Can there be, between humans and animals, relations of justice/injustice? Do animals care about their mates and their young, or do they merely associate with them on the prompting of their reproductive drive?

There is no dearth of material ascribed reliably to Aristotle which touches on these issues to one degree or another; the extant Aristotelian corpus gives us answers to many of these questions. Alas, they are in some areas inconsistent answers. Indeed, it has been persuasively argued by W.W. Fortenbaugh that there are two distinguishable theoretical frameworks within which Aristotle addresses questions of animal intelligence and character, and that these frameworks might yield contrasting verdicts on many of the above-raised questions.⁵

Aristotle the moral and political philosopher, it is argued, clearly demarcates the boundary between the human and the animal domains: humans alone possess the capacity to *think*, and since for Aristotle this capacity is crucial for emotional response, humans alone possess the capacity to respond emotionally to their fellow humans and more generally to their environments.⁶ By the same token, humans alone possess the crucial faculty of significant speech (λόγος), in which they make judgments concerning what is better and worse; in its social form, this linguistic discrimination forms the basis of political life, and therefore animals are ruled out of the political domain decisively.⁷

This is the outlook which informs the psychological theory offered in the *De anima* (2.3), which separates humans from animals and from plants on the basis

⁵ W.W. Fortenbaugh, "Aristotle: Animals, Emotion, and Moral Virtue", *Arethusa* 4 (1971), pp. 137-65. The general position presented in this paper, according to which Aristotle's two theoretical frameworks are to be related to the Platonic tripartite psychology and a more thoroughly Aristotelian bipartite psychology respectively, gets further treatment in Fortenbaugh's book *Aristotle on Emotion* (London: Duckworth, 1975). Of especial interest for issues relating to animals is chapter 4, section I ("A New Conception of Human Virtue"; pp. 63-70). Fortenbaugh argues that the zoological works contain ascriptions of virtue and emotion to (some) animal species; but that this "involves a change in the conception of emotion and moral virtue, is not especially useful for elucidating human behavior, and is not fundamental to Aristotle's thought" ("Aristotle: Animals, Emotion ..." p. 138).

⁶ Fortenbaugh's argument for the cognitive (judgement-presupposing) nature of emotional response rests heavily (though not solely) on the *Rhetoric*'s definitions of emotions such as anger and fear. This use of the *Rhetoric* as a key text may be problematic, however, since by its very subject this book has already delimited its terrain to applications of concepts in situations at least potentially *rhetorical*; it would thus appear to have ruled out animal behavior from the start (since an animal rhetoric is virtually unimaginable). We would expect that the way emotions are treated in the *Rhetoric* would be heavily weighted toward distinctively human ways of experiencing appeals to them, i.e., *via* cognitive channels.

⁷ Here the key passage is *Politics* 1.2 1253a7-18.

of different psychic capacities.

Of the capacities of the soul which were mentioned some possess all, some (possess) some of them, and some only one. Capacities mentioned are the nutritive, perceptive, appetitive, locomotive, and intellectual (διανοητικόν). The nutritive alone is possessed by plants, but in another (group) there is also the perceptive. If there is the perceptive, there is also the appetitive; for appetite includes desire and spirit and wish, and all animals have one of the perceptions, touch ... Some possess in addition also the locomotive capacity, and others also the intellectual capacity and mind (νοῦς), such as humans and possibly another similar being or a more honorable one, if there is such. (2.3 414a29-414b3 and 414b16-19)

The souls of plants are exhausted in their nutritional activities, in maintaining and increasing the growth of the beings whose lives they define. The souls of animals are slightly more complex even at the lowest level of the animal domain, for even the humble sea-slug possesses a sense of touch and therefore a perceptive capacity. Perception, along with the desires or appetites which it makes possible, define animal psychology. But intellect and mind are the exclusive possession of the human being—unless some other relevantly similar or superior life-form should exist.

Here there is no mention of any intellect-like powers on the part of non-human animals, and the language of the passage seems firmly to exclude such powers. What typifies the plant soul is x , what typifies the animal soul is $x + y$, and what typifies the human soul is $x + y + z$. There may be a creature similar to humans in displaying rationality, or even superior to humans in this regard (perhaps possessing $x + y + z + ?$), but there is no suggestion that this might turn out to be, for example, a newly discovered type of chimpanzee. *Dianoia*, discursive understanding with all that it implies, and *nous*, the source of intellectual or rational insight and comprehension, are reserved for beings at or above the psychic level of human nature.

But there is another side to Aristotle's treatment of animals, which blurs this clearly drawn distinction of level between human and animal, between intellect and perception, between anthropology and ethology. For in some contexts Aristotle is prepared to attribute apparently quite intellectual activities to animals, along with emotional complexities, political association, friendship and technological talent! Some of these contexts occur in Books 8 and 9 of the *Historia animalium*, which because of their disputed authorship I have temporarily set aside. But several others deserve our immediate attention.

In the *Eudemean Ethics*, in the discussion of friendship, Aristotle distinguishes friendships based on equality (ισότης) from those based on similarity or contrariety. Both the latter are lesser forms of friendship than that which is based on equality, but other lesser forms can also be seen to be related to the good (τὸ ἀγαθόν, the

'raison d'être' of the best kind of friendship). And one of the lesser forms is also explicitly ascribed to non-human animals. In *EE* 7.5, Aristotle is explaining the basis of friendships based on contrariety or opposition. Part of this basis is usefulness (τὸ χρήσιμον), for opposites of many types are useful to one another: master and slave, husband and wife. But another part is goodness, for opposites of some kinds find their proper middle state through meeting their opposite numbers.

In a way also the friendship of opposites is of the good. For they desire one another on account of the middle state (τὸ μέσον); like halves of tokens (σύμβολα) they desire one another, because in this way they are made one middle state from two. Thus accidentally it is of the opposite, but essentially it is of the mediating, for they desire not the opposite of each other but the middle state. (*EE* 7.5 1239b29-34)

The achievement of a middle state is illustrated with several kinds of examples, some drawn from outside the domain of friendship. Excessive heat is brought into its proper middle state by exposure to equally excessive cold, for example.

This kind (of relationship) exists even among soulless beings; but friendliness comes about when it exists among ensouled beings (ἐπὶ τῶν ἐμψύχων). (*EE* 7.5 1239b40-1240a1)

The biologically quite general terms used in the last passage indicate that Aristotle does not intend the friendship between mediating opposites to be restricted to human beings. In the discussion of friendship based on similarity immediately preceding these quoted passages, Aristotle has also widened the scope of his analysis to include non-human animals; here, however, friendship is not explicitly ascribed to the other animals. They are said to take pleasure in their similars because "by nature each thing is itself pleasant to itself", and our similars are similarly pleasant.

For this reason the voices and habits and company of kin (ὁμογενεῖς) are most pleasant to each other, *even among the other animals*. (*EE* 7.5 1239b19-21)

The combined force of these two passages, suggesting as they do that Aristotle is here thinking of human friendship as one manifestation of a larger biological phenomenon according to which both similarity and contrariety can attract living beings to one another and ground their affectionate relations, moves the non-human and the human emotional domains closer together. The basic dynamics of attraction are identical in the human and the beast, and in both they are metaphysically grounded in the teleology of the good.⁸

⁸ This biological generality of outlook is not manifest in the *Nicomachean Ethics* discussions of friendship. It would be interesting to know why this difference exists.

Regarding animal intelligence, we can also point to passages in Aristotle which appear to speak confidently of various intellectual abilities, of a greater or lesser degree of sophistication, in the purview of beasts.

The well-known opening passage of the *Metaphysics*, which orients human cognition in a broad field of psychic phenomena, introduces varieties of animal intelligence as follows:

By nature the animals have perception, and out of this memory does not come to be in some of them, but in others it does come to be. And on account of this these latter are more intelligent (φρονιμώτερα) and better learners than those not possessing the capacity to remember, and those which are not able to hear sounds are intelligent (φρόνιμα) without the ability to learn (like bees and any similar kind of animal which might exist), and as many as have this perceptive faculty in addition to memory can learn. They live by imagination and memory, but share in experience only a little. The family of human beings has also technical skill and reasoning. Experience comes about out of memory in human beings; for many memories of the same thing bring about the capacity of a unitary experience. (*Metaph.* 1.1 980a27-69)

On the face of it at any rate, this passage clearly attributes to some animals memory, some form of intelligence, the ability to learn, and a share however small in *empeiria*, the connected experience so crucial for genuine understanding of the world. It is also quite clear that even the group of animals which shares a little in experience falls short of the more important and distinctively *human* abilities to reason, to organize knowledge into bodies of technical acumen (arts or sciences) and to have the broadly coherent and unified concepts of the world which human *empeiria* constructs or presupposes. But to fail to reach the highest levels is not the same as never to be placed on the scale at all; animals clearly here are holding a place on a scale of *intellectual* abilities (not merely perceptive or sensitive abilities). And the passage is also quite free of the customary (and sometimes exasperating) Aristotelian qualifiers, such as “it is said” or “people say” (φασί), “so to speak” and “as it were” and “in a way” (πως etc.).

In the *Nicomachean Ethics*, there is a passage which appears to ascribe practical wisdom (φρόνησις) to animals. After explaining that practical wisdom’s domain is one’s own particular affairs, or one’s situation (rather than what is timelessly true such as “the white” or “the straight”), Aristotle continues:

On account of this even among the beasts some are said to be practically wise, as many as appear to have the capacity for forethought concerning their own lives. (*EN* 6.7 1141a26-8)

This is a much more hesitant claim, it is true, than the *Metaphysics* passage just

discussed. The qualification *phasin* is here present, and the beasts merely *appear* to display forethought.⁹

However, taken in conjunction with the *Metaphysics* passage above, it would not seem *prima facie* implausible to read Aristotle as here raising the possibility that practical wisdom, in some appropriately contextualized form, is present in any beast who is circumspect enough to reckon concerning its future. We might think of migratory animals, who watch for signs of impending winter and move to more temperate climes in response. It would be difficult to interpret this as a merely instinctive or mechanical behavior. What intellectual capacities are required for such reckoning is a digressive question which Aristotle does not here address.

Comparative judgments about animal intelligence also occasionally appear. In *De partibus animalium* 2, for example, a discussion of the effect of blood consistency and temperature on animal intellect appears.

Thicker and warmer blood is conducive to strength, thinner and colder makes for the perceptive and the intellective. The same difference holds also in the analogue to blood; on account of this bees and other similar animals are more intelligent in nature than many blooded animals, and of blooded ones those having cold and thin blood are more intelligent than their opposites. Best are those having hot and thin and pure (blood), for such animals are at once well off in regard to courage and to intelligence. (*PA* 2.2 648a3-11)

Another similar passage containing comparative judgements about animal intelligence and character appears at *PA* 2.4, 650b24-7; here there is added emphasis on the moral consequences of having thin blood—it entails a disposition to “timorousness” and easy fright. Thick hot blood, however, lends to passion and wild outbursts.

In *Generation of Animals* 1.23 Aristotle extends a portion of knowledge (γνώσις) to all animals, even those low forms which possess only the senses of taste and touch. In this passage also there is found an important observation about the importance of bearing in mind one’s *specific standard of comparison* when making judgments about animal intelligence. It is worth quoting at some length.

⁹ See the very skeptical treatment given the claim about animal *phronēsis* in this passage by Fortenbaugh, “Animals, Emotion ...” (cited above, note 5), p. 143. Fortenbaugh takes it that the *phasin* here marks the ascription of *phronēsis* to beasts as an “everyday view”. I question whether (a) it would be plausible to suppose that such a claim, that beasts display practical wisdom, is an “everyday view”; whether (b) we should always take Aristotle’s *phasin*-locutions as marking the views of others; and finally whether (c) even if we did this, we should further infer that the particular view of another is not in this case one which Aristotle shared. My own answer to all three questions is in the negative, but I owe supporting arguments.

... but all animals have also some kind of knowledge (γνῶσις); some more, some less, some extremely little. For they have sense-perception, and sense-perception is a kind of knowledge. The worth or worthlessness of this differs markedly as we consider it in comparison to practical intelligence (φρόνησις) or to the family of soulless entities. Compared with intelligence (τὸ φρονεῖν), it seems like nothing merely to share in touch and taste; but compared with insensibility (ἀναισθησία) it seems the best of things. (GA 1.23 731a31-b4)

The humble purchase on *gnōsis* which the lowest animals hold, when viewed in comparison to the sophisticated cognitive capacities of a human being, seems to fade into insignificance. The more complex participation in *gnōsis* enjoyed by animals possessing also sight and hearing may fare better in such a comparison, but it will still fail to match the human standard. However, and this is the important point, when considered in their own right, or in comparison to the possession of no cognitive capacities whatsoever, the animals' forms of *gnōsis* take on quite a different complexion. They emerge as the adequately rich sensitive abilities which Nature provides to all creatures for purposes of fully actualizing the potential of their kind.

In this passage, Aristotle makes a point which should perhaps help us to understand his occasional denials of intelligence to animals. We will want, when examining those passages, to bear in mind *what is the implicit standard of comparison*. This may provide us with the interpretative key to the apparent inconsistency in Aristotle's views on non-human intelligence and character.

We have now located the tension in Aristotle's ethology. There are passages which deny, and passages which grant, intelligence and moral substance to beasts. Fortenbaugh's solution to the problem is, as stated above, to analyze Aristotle's more generous statements about the beasts as coming out of a Platonist psychological framework, whose apparent shortcoming it is that humans and animals are *not* clearly enough distinguished for purposes of ethics and political philosophy. Within this framework, the meanings of emotion, virtue, cognition and related concepts are flexible enough to admit animal participation. But within the more genuinely Aristotelian framework, such concepts are used more precisely, with the result that animals are cut out of the intellectual and moral picture. This framework is invoked when Aristotle is focusing on the particularities of human existence and thus clarifying the true subject of ethics and politics: the human being.

I would like to postpone judgement about this way of resolving the problem of Aristotle's apparent inconsistency, and turn instead immediately to the question: Does Theophrastus display a similar ambivalence on animal intelligence and character? I will consider passages which suggest an affirmative answer to that question, but will argue that the appearance is deceptive. Finally I will return to Aristotle, and suggest a solution to the consistency problem which differs somewhat from those so far suggested.

II. THEOPHRASTUS ON ANIMAL INTELLIGENCE

The opening lines of Theophrastus' work *Historia plantarum* distinguish plants from animals in that plants do not possess "characters and actions" (ἥθη καὶ πράξεις), while animals do. It might appear that this claim is not terribly interesting, because Theophrastus is merely making a common-sense observation to the effect that when we study plants, we won't get an opportunity to talk about *behavior* as such; animals by contrast make possible rich stores of observational material regarding their activities.

But looked at in another way, the claim that animals possess *ēthē* and *praxeis* may be deeply consequential. Theophrastus cannot have been unaware that Aristotle *denies* that animals engage in *praxeis* (in *Nicomachean Ethics* 6.2 1139a19-20; though Aristotle does suppose that animals possess distinct characters, *ēthē*, at *Historia animalium* 1.1 488b13, 28). The reason for this denial seems to be bound up with considerations of voluntariness and decision; an action properly speaking is the outcome of some deliberation and choice. Animals can neither deliberate nor choose; therefore animals cannot act.

Is Theophrastus perhaps throwing down a gauntlet here, by claiming that animals, when properly understood in their own specificity, do in fact have *ēthē* and *praxeis* and that this is precisely where they part company with plants? One hesitates to claim this in the absence of any other corroborative evidence, but I make the suggestion to frame the evidence to follow, which will support a reading of the *HP* claim as a polemical divergence from the Aristotle who was capable of decisively distancing the human from the beast on intellectual and moral grounds. I will try to depict a Theophrastus who is much closer in spirit to the *GA* passage which stresses the importance of the context of comparison in deciding how to describe animals' "intelligence and character".

Two important passages which support this theme appear in Porphyry's *De abstinentia* but have been decisively placed as excerpts from Theophrastus' *De pietate*.¹⁰

In the first (*DA* 2.5 ff.), Porphyry quotes or paraphrases with approval Theophrastus' view that animal sacrifice is neither the original nor the most appropriate form in which to acknowledge and honor the gods.¹¹ In an ancient era, the practice of sacrificing to the gods originated among the most intelligent family of human beings, the Egyptians. The sacrifices themselves were of grass, hand-picked; they gradually came to include flowers and aromatic herbs. These

¹⁰ In my reading of these passages I have been enormously helped by the discussion and text-presentation of W.W. Fortenbaugh, *Quellen zur Ethik Theophrasts* (Studien zur Antike Philosophie, Band 12; Amsterdam: Grüner, 1984).

¹¹ The exact extent of the Theophrastean material in Porphyry's work is a matter of some dispute. I am working from the text as presented in Fortenbaugh, *Quellen* (cited above, note 10) pp. 54-65.

substances when burning gave off a fragrance likely to appeal to divine olfactory sensibilities (2.6.4). Animal sacrifice originates in some catastrophic era, famine or war, when human beings “touched blood” for the first time.

This innovation in religious worship is itself regarded as a divine *punishment* for the blood-letting behavior which sparked it off. Two improper responses to the new millennium in religion are mentioned: some people became unbelievers (ἄθεοι 2.7.3), and some (specifically, the Bassarians) became so enamored of blood sacrifices that they sacrificed humans, ate their flesh, then finally fell upon each other in an orgy of cannibalism and ate each other to death, totally destroying their society (2.8.3).

All these things being so, Theophrastus reasonably advises those wishing to be genuinely pious not to sacrifice ensouled creatures, using also other similar reasonings. (DA 2.11.3)

The horrifying Bassarians move the argument along because they illustrate the degrading potential of a certain way of regarding animals: namely, as mere adjuncts to human projects, possessing no intrinsic worth. The following line of argument develops this theme, contrasting animals with plants on the point of the legitimate exploitability of the latter. Plants and their fruits are said to be “the fairest and most noble of the things the gods produced for us”, and therefore appropriate sacrificial material (2.12.2). Why are animals not fairer and nobler *qua* divine gifts? The answer must be that animals *are not divine gifts to us at all*. They are something else, ensouled in their own right, not potential fuel for sacred flames. Plants, unlike animals, can be owned.

For although all things are from the gods, plants seem to be ours; for we plant seeds of them and we cultivate them and care for them with other blandishments. We ought then to sacrifice from our own, not from the things of others. (2.13.3-4)

Animals are *from* the gods but not *to* us! Animals are “absolutely more noble” (τιμιώτερα παντελῶς, 2.12.4) than plants, and their nobility consists in their possession of *soul*. “Soul is far more noble than the things which grow from the earth, and to take it away in sacrificing animals is not right (οὐ προσήκεν)” (2.12.4).

It is clear that the concept of soul is here being used in a non-Aristotelian way, since a variety of soul pertains to plants according to the *De anima* (see for example the passage from 2.3, quoted above in Section I). Here, however, plant souls are denied while animal souls are affirmed and described as intrinsically valuable, worthy of honor.

After a reference to and quotation from Empedocles, the argument picks up with the following comment:

54 Theophrastus

For I think that when friendship and a perception of kinship held sway among all, no one killed anything, believing in a kinship (οἰκεῖα) with the rest of the animals. (2.22.1)

It is difficult to know whether to attribute this section of text to Theophrastus or to regard it as a remark by Porphyry. I am inclined to regard it as Porphyrean, in part because of the “I think” with its personal and rather abrupt air, in part also because Theophrastus does not typically quote Empedocles with approval.¹²

But we do have a passage, still from the *De abstinentia*, in which Theophrastus is named and similarity between humans and animals is offered as grounds for fairer treatment of beasts. It is an argument from kinship based on common origin and common causes or principles, to the conclusion that there exists some morally significant relationship of affinity between humans and animals.

Theophrastus used this argument. Those who are of the same birth-origin, I mean father and mother, we say are naturally akin (οἰκείους εἶναι φύσει) to one another. And indeed we consider those who are of the same forefathers to be akin, and even our fellow-citizens in that they share the same earth and one another’s company. (DA 3.25.1)

In an outward movement of generality here, the passage likens Greek to Greek, barbarian to barbarian, and all human beings to one another. For they will either have common ancestry, or they will be related on the basis of common food, habits, and genus. It continues:

Thus also we posit that all human beings are akin (συγγενεῖς) to one another, *and even to all the animals*; for the first principles (ἀρχαί) of their bodies are by nature the same; I don’t mean taking this to the level of the first elements, for plants are also constituted of these; but ones like skin, flesh and the kinds of fluids naturally present in animals. And much more, because the souls of these not naturally different, I mean with respect to appetites and angry impulses, and still more reasonings and most of all perceptions. But just as with bodies, so also with souls some animals have more complexities and others less, but

¹² In the *De sensu*, for example, Theophrastus subjects Empedocles to ruthless criticism in eighteen sections of the book, and even uses resemblance to Empedocles as an independent criticism when discussing Anaxagoras’ views (section 35). See George Malcolm Stratton, *Theophrastus and the Greek Physiological Psychology before Aristotle* (London: Allen & Unwin, 1917). Stratton remarks on the generally strong tone of the criticisms of other philosophers contained in this treatise, however, when “... Theophrastus suddenly changes from reporter to critic. He turns upon the one he has brought before us, raining upon him blows as of tempered steel” (53)!

in all of them the first principles are by nature the same. Clearly there is a kinship (οἰκειότης) among their emotions (πάθη). (DA 3.25.3)

This line of reasoning traces its way outward through concentric circles of relationships, beginning from the relation between children of the same parents. This is perhaps the most immediate and natural relationship we experience, in addition to being the closest genetically.¹³ Common ancestry is next closest, and is still “kinship” in a thoroughly non-metaphorical sense. The relationship of fellow-citizens is traced to their shared locale and to their social interactions, which jointly constitute a quite concrete commonality of environment and consciousness. Moving rapidly outward now, first all Hellenes and all barbarians are related to one another, and then all human beings are said to be akin to one another, *along with all other animals*, and with this we reach the outermost circle of relationship. The connection is based on their commonality at the level of *archai*, first principles or causes understood not in the most metaphysically general way possible but to include somatic properties of perceptive bodies. All the animal kingdom, including human beings, is made of the same basic flesh-stuff and has some share in the perceptive powers to which this flesh is heir; *this* marks the decisive difference-line in the life-world as a whole. Between other natural objects and sentient natural objects there lies a genuine chasm, bottomless and vast; and the mysteries of sentience are celebrated by humans and beasts together, while plants stand dumbly by.

Whether Theophrastus went on from this reflection to argue for abstinence from animal food is far from clear. Porphyry certainly pulls the argument in that direction. But it may have been Theophrastus’ sole purpose to make this point about the affinities in the life-world. And it is a genuinely polemical point, in light of the fact that Aristotle denied that humans and animals have anything morally significant in common.¹⁴

Thus we can ask the question: at what point in the ever-widening circles of affinity which are traced in the passage from *De abstinence* 3 cited above does literal *relatedness* stop and metaphorical “*affinity*” begin? Genetic continuity such as exists between siblings, between family members, and between ancestors and their heirs is real relationship. The “family of man” may not be, if national and even regional differences are sufficiently stressed. And the commonality between humans and animals on the basis of (in some cases extremely low-grade) sentience may be attenuated beyond meaningfulness.

But here we must remember Theophrastus’ scientific method, as we know it from the fuller works on plants. He is at all times conscious of the constitutive

¹³ A parent and a child have at most only half of their genetic material in common, whereas two children of the same parents are (potentially) genetically homologous.

¹⁴ See *Nicomachean Ethics* 8.11 1161a32-b3 for Aristotle’s assertion that humans and animals cannot be friends *because they have nothing in common*.

effects of environments on the animal types which inhabit them.¹⁵ The waterless deserts of Libya are inhabited by animals which can go three days without water, a fact about their nature which does not change when these animals are brought into captivity in wetter climes (*HP* 4.3.5). Their desert adaptation has become part of their very nature. So also the common constraints of being earth-creatures made of flesh construct a common nature among all members of the animal domain including humans. None of us can live without water altogether; none of us is nourished by rock; none of us can go on living eternally; etc.

In the list of mental activities which are shared among the sentient members of our life-world, no clear demarcations are made. This is very far from being an organized psychological hierarchy such as we saw in Aristotle's *De Anima*. Indeed the list is so randomly assorted that the very randomness must be read as part of its purpose ("... appetite and the desires, and still more reasonings, and most of all perceptions ..."). The writer is being inclusive by being unselective, as one might mention the components of a lavish banquet in no particular order simply to emphasize their sumptuous collectivity. The implication of the list's variety-enhancing randomness, in the Theophrastus passage above, is that in one part of the life-world, the sentient part, there is all of this going on: desiring and hungering and reasoning and above all, a vast quantity of perception. Whereas in the other part, among the plants and stones and soil, there *isn't*. And if we wish to talk about important far-reaching differences and similarities, as a dialectician fond of *diairesis* such as Theophrastus undoubtedly does, then here is a fundamental difference, and a significant similarity, which is worth noting.¹⁶

¹⁵ See J. Donald Hughes, "Theophrastus as Ecologist", in *Theophrastean Studies: On Natural Science, Physics, and Metaphysics; Ethics, Religion, and Rhetoric* = *Rutgers University Studies in Classical Humanities*, vol. 3 (New Brunswick: Transaction, 1987) pp. 67-75.

¹⁶ Before leaving the context of Porphyry and animal sacrifice, I would like to mention that in Szegegy-Maszak's edition and discussion of Theophrastus' *Nomoi*, there is a short text of Josephus which may give us one more instance of Theophrastus disapproving of animal sacrifice. Josephus is trying to demonstrate, in the *Contra Apionem*, the antiquity and respectability of Hebrew customs. He quotes Theophrastus' *Nomoi* as useful testimony (S.-M.'s translation):

Long ago our people was not unknown to other cities, to some of which many of our customs have already migrated and have been deemed worthy of imitation. Theophrastus makes this clear in the work on the Laws; he says that the laws of the Tyrians forbid the swearing of foreign oaths, among which, along with some others, he includes the oath called the "corban". This will be found among no people except for the Jews ... (*C. Apionem* 1.166-7).

Szegegy-Maszak explains that the *korban* was an oath sworn over a sacrifice. Without any sort of context, or any chance of catching the rhetorical flavor of Theophrastus' noting this particular oath, it can only be speculation that this ban of the Tyrians might have been noted with approval. Certainly according to the arguments just reviewed, the *korban* would have been an unholy oath. See p. 74 of Andrew Szegegy-Maszak, *The Nomoi of Theophrastus* (Monographs in Classical Studies; New York: Arno Press, 1981).

We will glance briefly at one more text of Theophrastus, this time from the botanical work *De causis plantarum*. At CP 2.17.5, Theophrastus wonders about the growing habits of plants which live entirely situated *upon* other plants. In a genuine throwaway comment, he suggests that perhaps they do this because they are fond of one another! But he ends this fancy with an important comparison: Perhaps such plants do this “because they are fond of each other and thus live together, just like animals do” (προσφιλή μὲν γὰρ δὴ ἀλλήλοις καὶ σύμβια, καθάπερ καὶ τὰ ζῷα). Because of the oddness of the idea that plants could be motivated by affection, especially given the fact that such guest-host relationships can result in the death of the host-plant (as Theophrastus will surely have known), I cannot rest much on this text. However, I do think the suggestion that animals group together in part because of an emotion-like attitude toward one another is secure. The adjective *prospihilēs* is not a strong emotion-term but neither is it devoid of emotional content. Thus, we can conclude that some animal associations are viewed by Theophrastus as more than mutual protection societies or merely instinctive huddlings.

To sum up our results so far, then, we have Theophrastus maintaining, in what was very possibly a polemical stance, that (a) non-human animals are of intrinsic value, considered as possessors of souls which are importantly different from those of plants; (b) the souls of animals can be truly said to possess capacities which link them to humans cognitively and morally, and which distance them from the other natural beings; and (c) the associations of animals have a partially emotional basis which is similar to the (richer) emotional basis of human friendship.¹⁷

On all of these points, the Aristotelian corpus has texts that would disagree, but also texts that would agree. And, to compound our difficulties, Theophrastus also has another side in relation to animal intelligence and character, which closely resembles that of the Aristotle who decisively distances humans from animals in regard to both intelligence and moral attributes.

Photius is the source for a fragment in which Theophrastus discusses animals

¹⁷ On the question of animal friendships, we should not overlook the extremely curious fragments (from Aelian and Gellius, in Fortenbaugh, *Quellen*, cited above, note 10, p. 83, and see his commentary pp. 323-4) in which Theophrastus is associated with several stories about what appear to be animal/human love affairs. In the Aelian passage, *De Natura Animalium* 5.29, Theophrastus is said to have maintained that a goose fell in love with a boy and brought him presents (one wonders what sort of presents the goose chose); and also that a citharodist was so beautiful that she was loved not only by men, but also by a goose and a ram. Gellius says Theophrastus tells of some dolphins who loved attractive swimming youths “most flagrantly” and “in a human-like manner”. One hardly knows what to make of such stories, absent any semblance of context. But it is certainly possible that they constitute anecdotal evidence adduced by Theophrastus in an attempt to illustrate animals’ capacity for emotional experience.

who are said to display envy or grudgingness (φθόνος).¹⁸ Several examples are given: the lynx hides its useful urine, the gecko-lizard consumes its molted skin, the stag buries its right horn when shed, etc. Theophrastus explains that attributing these bits of behavior to envy is a particular kind of mistake; people who think this way are merely applying their own preconceptions (ὑπολήψεις) to the situation. In other words, they are engaging in anthropomorphism. There follows a rhetorical question: "For from whence could such wisdom come to unreasoning creatures (ἄλλοιοι), which reasoning creatures learn by means of long training?" There follow some more scientific suggestions about what might motivate such behaviors, and a cautionary reflection on anthropomorphic ethology. "Many other things are done by unreasoning creatures, of which we do not have it in our power to explain the causes."

Here animals are bluntly and twice designated as unreasoning, therefore not possessed of the psychic complexity which envy presupposes. Is this a different Theophrastus than the one who was willing to discuss the "amores flagrantissimi" of dolphins? In other words, does this passage entail a *denial of all emotion to animals*? Clearly not, for as Fortenbaugh points out, the argument leaves it open that animals may feel envy toward members of their own kind.¹⁹

It would also appear that envy, coupled with the modes of devious behavior just mentioned, constitutes a particularly complex emotional situation. If I were an envious gecko-lizard, I would have to be capable of the following cognitive experiences: realizing that my skin is desired by humans, therefore understanding the volitional states of very different creatures (something humans themselves have considerable trouble with, and even within our own species!); resenting their ability to use it, or their superior size and strength, or something, therefore of resentment *per se*, therefore of the complex comparative judgement-set which resentment entails (*x* has benefit *b*, I am more deserving of *b* than *x*; *x*'s enjoyment of *b* is thus a source of felt injury to me); the imaginative representation of the human being enjoying my skin; and all the planning which goes into the stratagem of eating it myself (not to mention overcoming my possible disinclination for such food). In short, envy and subterfuge may be some of the more complex modes of behavior even among *human* emotional responses. I submit that this passage by itself does not rule out Theophrastus' claiming that animals experience emotions of simpler or more cognitively primitive sorts, like fear.

But it is undeniable that animals are flatly designated as *alogoi* twice in the passage. What should we take this to mean? At least one scholar, for reasons that are not given, is inclined to view the sentences containing the term as eruptions of Photius himself.²⁰ But let us instead suppose that the sentences *are* part of

¹⁸ In Fortenbaugh, *Quellen* (cited above, note 10) pp. 18-19, and see his discussion pp. 159-61.

¹⁹ Fortenbaugh, *Quellen* (cited above, note 10) p. 161.

²⁰ W.K. Kraak, "First Attempts at Animal Ethology in Greek Biology (Theophrastus)",

the Theophrastean argument. What would they entail? It is possible that the term *alogos* could be read as indicating the absence of the capacity for significant speech. As such, it would be functioning as a neutral designation of non-human animals, entailing nothing substantive about their intellectual and psychological limitations.

But perhaps it seems also to carry an unmistakable flavor of derogation or devaluation. If so, how serious is the charge against the *sophia*-lacking beasts here? Let us look again at the context, insofar as we are able. Theophrastus is arguing that animals should not be supposed to be burying their horns, gulping their skins, etc. out of conscious spitefulness. The particular *sophia* of which animals are said to be incapable is that entailed by malicious resentment and spiteful plans to do others out of some commodity they desire, even if one has no real use for it oneself. It is this kind of "wisdom" which is said to be, for reasoning beings, the product of long and careful learning.²¹ It may well be that what Theophrastus is implying here is the comparative goodness or at least innocence of the animals in question. Unlike humans, animals aren't even capable of being that petty. True, this innocence is, like that of very young children, a result of inability rather than careful virtue; but we value the innocence of children nonetheless.

We should also add here, while on the subject of animals' moral characters, that Theophrastus does not make of brutishness a vice in the way that Aristotle and many other Greek moral philosophers did.²² In the *Characters*, the concept of brutishness or bestiality is used only in connection with the Nasty Man, and there refers to the fact that this offensive person is said to have the armpits of a beast and fur all over his body. Here it seems clear what brutish quality is in question: simple hairiness (perhaps combined with a strong natural odor?). There is no suggestion of bestial *behavior* which would be reprehensible in a human, only a physical trait. Thus animals are not used by Theophrastus as negative moral examples, nor is their customary behavior used as a source of analogies to human vice.

If all this seems too speculative, however, we could still read the designation of animals as *alogoi* in a way that renders it non-prejudicial to their possession of some form of general intelligence. We could construe the *sophia* of which they are bereft here as equivalent precisely to the stratagems involved in the behavior, the planning and necessary counterfactual judging ("If I don't gobble up my skin that *human* might get it") which envious behavior seems to require. Many humans are not particularly adept at strategies and at using the subjunctive mood, either.

in *Actes du VIIe Congrès International d'Histoire des Sciences*, Jerusalem 1953, pp. 411-14.

²¹ It is possible that the use of the term *sophia*, and the reference to a lengthy learning process, are ironic, as in, "You've got to work real hard to get THAT bad".

²² An interesting discussion of brutishness and its role in speculative Greek anthropology is that of Michael J. O'Brien, "Xenophanes, Aeschylus, and the Doctrine of Primeval Brutishness", in *Classical Quarterly* 35 (1985), pp. 264-77.

On balance, then, I do not take this Photius passage to prejudice Theophrastus' outlook on animal intelligence.

Another passage which might seem to count against a generous attitude toward animals is *De sensu* 25. Here Theophrastus is discussing Alcmaeon, and quotes his doctrine about the difference between animal and human intelligence as follows:

Of those who do not explain perception by similarity, Alcmaeon first defines the differences among animals. For he says that humans differ from the other animals because they alone understand, whereas the others perceive but do not understand. He supposes that thinking and perceiving are distinct, not—as Empedocles holds—the same thing.²³

Is Theophrastus quoting this denial of understanding to animals with approval, or in a spirit of neutrality? It is impossible to give a certain answer, but I believe one should be cautious about imputing approval to this context. For Alcmaeon's clarity of distinction is based on his belief that human beings possess an immortal soul; as Diogenes Laertius puts it, "He said that the soul is immortal and that it moves continuously like the sun".²⁴ I believe that Alcmaeon's Pythagoreanism is foreign to Theophrastus' general psychological outlook. There does seem to be approval for the distinction between thinking and perceiving; and once again the hapless Empedocles is implicitly reproached for failing to note an important difference. But in the absence of stronger corroboration than I have been able to find, I would be disinclined to attribute the dichotomy between human understanding and animals' mere perception to Theophrastus himself.²⁵

This leaves us with a Theophrastus who displays more interest in the continuities between human and animal intelligence and character than in the discontinuities. He finds among life-forms possessing sentience in whatever form a strong connecting link. The philosophical consequences of this disposition must remain largely unknown to us, but we can speculate that if he were working today in theory of knowledge, he would be inclined toward naturalized epistemology, and as a moral philosopher might regard the more careful speculations of sociobiological thinkers with approval.

²³ Theophrastus, *On the Senses* 25.1-6; the translation is that of Jonathan Barnes in *Early Greek Philosophy* (New York: Penguin, 1987), p. 91.

²⁴ Diogenes Laertius, *Lives of the Philosophers* VIII. 83; translated by Jonathan Barnes in *Early Greek Philosophy* (New York: Penguin, 1987) p. 89.

²⁵ We should also note that at *De Sensu* 32, Theophrastus (speaking for himself now and criticizing Anaxagoras) does point out that *aisthēsis* and *dianoia* are in some deep way related, for "both are by the same *logos* directed to the same use" (5-6). This is a difficult sentence, but I take it Theophrastus is reminding us that both *aisthēsis* and *dianoia* are strategies for bringing a soul into a proper relation to its habitat (to speak as generally as possible). Again he is avoiding dichotomies, making bridges rather than barriers.

Let us now return, by way of conclusion, to the tension in Aristotle's remarks on animal intelligence and character with which we began. For I believe that Theophrastus as I have described him can help us resolve these apparent contradictions.

III. CONCLUSION

I believe that the differences between the Aristotelian and the Theophrastean approaches to animal intelligence and character partially resolve themselves into questions of emphasis. While Aristotle is given to marking dissimilarities between humans and non-human animals, Theophrastus is inclined to find deep underlying similarities. This kind of difference of emphasis could be found even between two thinkers who shared *all* substantive beliefs about the extent of animal intelligence; it could even, as the divergences within Aristotle's own writings show, be found within the thoughts of the self-same individual at different times and in different theoretical contexts. We have seen that Aristotle is often (but by no means always) given to stating distinctions between humans and animals in clearly dichotomous terms, but also that he is sensitive to the critical importance of context and standard of comparison in such endeavors (GA 1.23 731a32-b3 explicitly demands such sensitivity). And we have seen that Theophrastus is more given to emphasizing the continuities among soul-capacities throughout the sentient life-world, though at the same time he is explicitly committed to avoiding anthropomorphism and projection of human traits (including our vices!) onto the non-human animal domain (the Photius passage discussed above gives clear warning about this).

Insofar as Theophrastus collides with Aristotle's denials of knowledge, emotion, and forethought to animals, and therefore contradicts this side of Aristotle's dual view on animals, he can be seen as carrying Aristotle's own naturalism about intelligence and virtue still further.²⁶ The coincidence on the question of animal friendships, between the *Eudemian Ethics* passages discussed above, and Theophrastus' outlook on this subject, is a case in point.²⁷ If Aristotle and Theophrastus worked together in a true collaboration, as they must have, then the Theophrastean inclination to see similarity and kinship where Aristotle sometimes saw blank difference would have been accommodated within the collaboration somehow. Seen in this way, the tensions about animal intelligence within the Aristotelian corpus are not disturbing discords but may rather provide a fascinating

²⁶ This is my main disagreement with Fortenbaugh's way of treating the apparent contradiction within Aristotle; for Fortenbaugh tracks the dissonance back to Plato, and I would rather see it moved forward, to Theophrastus. For F.'s view, see the works cited in note 5 above.

²⁷ This might provide some small support for a later dating for *EE*.

62 Theophrastus

glimpse into what must have been one of the most joyous intellectual partnerships of its era, and perhaps of all time.²⁸

²⁸ Research for this paper was begun at a summer Institute, funded by the National Endowment for the Humanities, on "Aristotle's Philosophy: Metaphysics, Biology, and Ethics", organized by Allan Gotthelf. Presentation of an earlier draft at the Vth International Conference of Project Theophrastus, in August 1989 on Lesbos, was partially funded by a grant from the Office of International Education of the University of Minnesota. At the conference I learned a great deal through the comments and criticisms of other conference participants; I am especially thankful to Richard Sorabji, Anthony Preus, and William Fortenbaugh.

Physikai doxai and *Problēmata physika* from Aristotle to Aëtius (and Beyond)

Jaap Mansfeld

I. ΦΥΣΙΚΑΙ ΔΟΞΑΙ

In the introduction to his *Doxographi Graeci*¹ Diels argued that ps.-Plutarch *Περὶ τῶν ἀρεσκόντων τοῖς φιλοσόφοις φυσικῶν δογμάτων βιβλία ε΄*—usually latinized as *Placita philosophorum* rather than as *Placita physica*—and substantial excerpts concerned with natural philosophy to be found in Stobaeus' *Eclogae physicae* and Theodoret's *Graecarum affectionum curatio* derive from a common source, to be dated to the 1st cent. CE, which he ascribed to a certain Aëtius.² He also argued that substantial sections of ps.-Galen's *Περὶ φιλοσόφου ἱστορίας* derive from a somewhat fuller version of ps.-Plutarch³ and so, ultimately, from Aëtius as well. Adducing a plurality of other sources (such as Cicero, Aenesidemus *ap.* Soranus *ap.* Tertullian, Aenesidemus *ap.* Sextus Empiricus, and Varro *ap.* Censorinus),⁴ Diels further argued that Aëtius and others had used an earlier doxographic work to be dated to the 1st cent. BCE, to which he gave the name "*Vetusta placita*".⁵

As is well known, according to Diels the main ancestor of the *Vetusta placita*—and so of Aëtius—is a lost treatise in eighteen books by Theophrastus⁶ which,

¹ Berlin: G. Reimer 1879, W. de Gruyter 21929 (and later reprints); hereafter *DG*. The best short guide to the labyrinthine reasonings of Diels' Prolegomena is O. Regenbogen, *Theophrastos*, in: Pauly-Wissowa, *Realencyclopädie der classischen Altertumswissenschaft* Supp. VII, Stuttgart: J. B. Metzlersche Verlagsbuchhandlung 1940, 1535-9.

² *DG* 45 ff.

³ *DG* 233 ff.

⁴ *DG* 185 ff.

⁵ *DG* 178 ff. In an article published 14 years later, *Über das physikalische System des Straton*, SBBerlin 1893, 101 f., repr. in H. Diels, *Kleine Schriften*, ed. W. Burkert, Darmstadt: Wissenschaftliche Buchgesellschaft 1969, 239 f., he speaks of the "ἀρέσκοντα ... eines Poseidonianers".

⁶ *DG* 102 ff., 217 ff.

following his *Doktorvater* Usener, he called *Physicorum opiniones* (Φυσικῶν δόξαι).⁷ Lemmata concerned with the Presocratics taken from Aëtius or the *Vet. plac.* found their way into the *Fragmente der Vorsokratiker*, and because of their presumed derivation from Theophrastus' work—which has been taken to be a sort of history of natural philosophy—have often been taken seriously as sources of information, especially in those cases where no verbatim fragments survive which would attest specific doctrines.

In Theophrastus' bibliography at Diog. Laërt. V 48 the title is given in the genitive, Φυσικῶν δοξῶν, which means that the intended nominative may have been either Φυσικῶν δόξαι (*The Tenets of the Philosophers of Nature*) or Φυσικαὶ δόξαι (*The Tenets in Natural Philosophy*). Scholars have been divided over this issue; although the majority have followed Usener and Diels, there are a number of noteworthy exceptions.⁸ What we have here is by no means a minor problem, because the precise meaning of the title is influential in determining our impression of what the book was about. In the present paper, I shall try to demonstrate, in various ways, that the book-title has to be Φυσικαὶ δόξαι. I may point out already that the only time the full title is quoted elsewhere⁹

⁷ H. Usener, *Analecta Theophrastea* (1858), repr. in his *Kleine Schriften* I, Leipzig: B. G. Teubner 1912, 71 ff., speaks of "Theophrasti de physicorum opinionibus". What Diels assumes to be fragments of this treatise are printed at *DG* 475 ff. The greater part of these, however, should be attributed to Theophrastus' *Physics*; see P. Steinmetz, *Die Physik des Theophrast*, Palingenesia 1, Bad Homburg etc.: Gehlen 1964, Beilage: "Theophrasts Physik und ihr Verhältnis zu den Φυσικῶν δόξαι", 334 ff., and J. Mansfeld, "Gibt es Spuren von Theophrasts *Phys. op.* bei Cicero?", in: W. W. Fortenbaugh - P. Steinmetz (eds.), *Cicero's Knowledge of the Peripatos*, Rutgers Studies in Classical Humanities Vol. IV, New Brunswick, N. J. - London: Transaction Books 1989, 133 ff.

⁸ Φυσικαὶ δόξαι is the title used by E. Zeller in his review of the *DG*, *Deutsche Literaturzeitung* 1 (1880), 227, by U. v. Wilamowitz-Moellendorf, *Antigonos von Karystos*, Philologische Untersuchungen 4, Berlin: Weidmannsche Buchhandlung 1881, repr. Berlin - Zürich: Weidmann 1965, 89, by F. Susemihl, *Geschichte der griechischen Literatur in der Alexandrinerzeit* I, Leipzig: B. G. Teubner 1891, repr. Hildesheim: Olms 1965, 496, by F. Leo, *Die griechisch-römische Biographie nach ihrer literarischen Form*, Leipzig: B. G. Teubner 1901, repr. Hildesheim: Olms 1965, 100, by E. Reitzenstein, *Theophrast bei Epikur und Lukrez*, Orient und Antike 2, Heidelberg: Carl Winter 1924, 45, by H. Strohm, "Zur Meteorologie des Theophrast", *Philol.* 92 (1937), 250 n. 5, by A.-J. Festugière, *La révélation d'Hermès Trismégiste* II, *Le dieu cosmique*, Paris: Librairie Lecoffre 1949 and later repr., 360, and by M. Sollenberger, *Diogenes Laertius' Life of Theophrastus*, Ph.D. Diss. Rutgers University 1984, 340. One may compare titles such as Φυσικαὶ θέσεις, Αἰτίαι φυσικαί, Ζητήματα or Προβλήματα φυσικά, and *Naturales quaestiones*; for the latter formula not as a book-title but as the subject-matter of a thesis see Cic., *De part. orat.* 64 (quoted *infra*, text to n. 75). Cf. further H. M. Hine, *An Edition with Commentary of Seneca Natural Questions, Book Two*, Salem, New Hampshire: Ayer Company 1981, ²1984, 27 ff. For a preliminary argument in favour of Φυσικαὶ δόξαι see my paper cited *supra*, n. 7, 157 n. 49.

⁹ Taurus *ap. Philop.*, *Adv. Proclum* 145.20-1 Rabe = Theophr. *Phys. op.* fr. 11 *ap. DG* 485.17. See *infra*, § VIII.

it runs *Περὶ τῶν φυσικῶν δοξῶν*, which can only mean *On the Physical Tenets*.¹⁰ I submit that in this work the tenets were the main issue, not the persons who subscribed to them, although the name-labels may of course have served to pinpoint tenets and to provide links between tenets concerned with different topics. This, at any rate, holds for Aëtius and the other sources which are assumed to be the later descendants of Theophrastus' work.¹¹

That the tenets are what matters most, not the persons who held them, also follows from another consideration. Ps.-Plutarch—occasionally¹² confirmed by the parallel sources—rather often includes the views of medical authorities (two references in book I 23, thirty-two in books IV and V).¹³ Accordingly, a selection of medical views concerned with issues in theoretical physics but especially with issues in the fields of psychology, spermatology, embryology, fevers, and health/disease/old age, that is to say with subjects which were studied by both physicists and physicians, were added to the stock of physical doctrines. I argue that the references to Euryphon of Cnidus, Hippocrates, Polybus, and Diocles of Carystus in these books derive from the *Φυσικὰ δόξαι*. Those to the Hellenistic physicians Herophilus, Erasistratus, Asclepiades and others were added later, just as the lemmata concerned with the tenets of Aristotle and of the Hellenistic philosophers were added to the original collection dealing with the Presocratics and Plato.

Aristotle, both at the beginning and at the end of the *Parva naturalia*, points out that natural philosophy and medicine to a certain extent tend to overlap. The more accomplished natural philosophers *conclude* their work with the principles of health and disease, and the more sophisticated doctors say something about

¹⁰ For the form *Περὶ τῶν ...*, cf. *Περὶ τῶν προβλημάτων φυσικῶν α'* in the bibliography of Theophrastus at Diog. Laërt. V 48—and 49, obviously a duplicate—(not *Προβλήματα ... φυσικά* as at VII 47). For titles with and without *περί* cf. e.g. the two distinct works *Περὶ φυσικῶν* and *Φυσικῶν* at V 46; note that the first of these is quoted by Alex. of Aphrodisias at *In Met.* 31.7 f. (= Theophr. *Phys. op.* fr. 6 ap. DG 482.6) as *Περὶ τῶν φυσικῶν*.

¹¹ See my paper "Doxography and Dialectic: The *Sitz im Leben* of the *Placita*", *ANRW* II 36.4, Berlin - New York: W. de Gruyter 1990, 3065 ff. and *passim*. I wish to point out that David T. Runia and the present writer arrived at this conclusion independently and by different roads. We have pooled resources and are currently engaged in writing a book on Aëtius and the *Vet. plac.*

¹² It should be noted that for most of Aët. IV-V the parallel sections in Stobaeus are lost, and that Theodoret did not use these books.

¹³ References to pre-Theophrastean (and pre-Menonean) doctors in the *Plac.* of Aëtius as reconstructed by Diels are as follows: one to Euryphon of Cnidus (V 18.7; name only, rest of lemma lost), two to Hippocrates (IV 5.1; V 18.4), two to Polybus (V 18.3.5), and six to Diocles of Carystus (V 9.1, 13.2, 14.3, 18.3, 29.2, 30.2). Except the Hippocrates lemma—from Theodoret—at IV 5.1 on the seat of the *hēgemonikon*, these are all in book V. These chapters as a rule contain tenets of natural philosophers too. The sequence of lemmata at V 18 does not take the dates of the doctors into account.

nature and derive their principles therefrom.¹⁴ Accordingly, it would seem that Theophrastus in the *later* books of his *Φυσικαὶ δόξαι* (corresponding to Aët. IV-V) included the views of some outstanding doctors. Diels published the *DG* before the papyrus containing an important medical doxography—called *Anonymus Londinensis*—was discovered, and believed that between Meno, who in his view wrote on the physicians only, and Theophrastus, who wrote on the physicists only, a strict *Arbeitsteilung* existed. *Quod non*. Meno, or perhaps rather Aristotle (?) in his *Collection of Medical Doctrines*, included the medical doctrines of (at least) three philosophers: Hippo is treated briefly, Philolaus more extensively, and Plato at considerable length.¹⁵ Arguing from analogy, one fails to see why a selection of physical—or physico-medical—tenets held by outstanding physicians should have been prohibited from inclusion in a collection of *φυσικαὶ δόξαι*. One might also add that Theophrastus deserves a place among those whom Aristotle calls the more accomplished philosophers. According to his bibliography at Diog. Laërt. V 44-46, he wrote no less than thirteen monographs dealing with medical subjects. Three of these essays survive entire: the *Περὶ ἰδρώτων*, the *Περὶ ἰλίγγων καὶ σκοτώσεων*, and the *Περὶ κόπων*.

¹⁴ Arist. *De sens.* 436a17-b1 and *De resp.* 480b23-30. Cf. L. Edelstein, "The Relation of Ancient Philosophy to Medicine" (1952), repr. in: *Ancient Medicine*, Selected Papers of L. E. ed. by O. Temkin & C. L. Temkin, Baltimore 1967, repr. Baltimore - London: The Johns Hopkins Press 1987, 354.

¹⁵ Edited by H. Diels, *Anonymi Londinensis ex Aristotelis Iatricis Menoniis et aliis medicis eclogae*, Supplementum aristotelicum III.1, Berlin: G. Reimer 1893; additional information at F. G. Kenyon, *Some Additional Fragments of the London Medical Papyrus*. (Mit einem Anhang von H. Diels), SBPreussAk. 93 (1901), 1319 ff. For the philosophers treated see *An. Lond.* cols. xi.22-42 (Hippo, *Vorsokr.* 38A11), xviii.8-xix.1 (Philolaus, *Vorsokr.* 44A27), xiv.11-xviii.8 (Plato, from the *Tim.*). Aristotle's view on sleep is expounded xxiii.42 ff. Diels, *DG* 222, had argued that the doctrines of the more ancient doctors have been incorporated in the *Plac.*—in view of the context, he must mean the *Vet. plac.*—from, ultimately, the *Ἱατρικὴ συναγωγὴ* (the title is significant: not *Ἱατρῶν σ.*), or *Μενώνεια*, of Aristotle's pupil Meno, and that in this way they were added to the material on the *φυσικοί* which as he believes derives from Theophrastus, but he does not say when this occurred. *Ibid.*, 185, he derived the lemmata concerned with the physician Asclepiades (late 2nd cent. BCE), the most recent doctor to be mentioned by name, from the *Vet. plac.*; see also the reference in the index nominum s.v. Asclepiades: "ultimus [scil., medicus] in vetustis Placitis". In his much later paper "Ueber die Excerpte von Menons Iatrika in dem Londoner Papyrus 137", *Hermes* 28 (1893), 407 ff., he argued that *Anon. Lond.* is to be dated to the time of Domitian or Trajan and derives from the *Ἀρεσκόντα* of Alexander Philalethes who for the earlier history of the theories concerned with the aetiology of diseases used Menon's *Ἱατρικὴ συναγωγὴ*. J. H. Waszink, *Tertulliani De anima*, Amsterdam: J. M. Meulenhoff 1947, 29* f. n. 8, correctly points out that Diels is not clear about the history of the relations between the medical and the more strictly philosophical historiographic traditions, but fails to notice that Diels actually does assume that medical doctrines were incorporated in the *Vet. plac.*

A new edition of *An. Lond.* is being prepared by D. Manetti, see her paper "Note

II. WHY COLLECT ΔΟΞΑΙ?

My hypothesis is that Theophrastus' Φυσικαὶ δόξαι was a huge collection of materials to be used in dialectical and/or scientific discussion. This at any rate is the *Sitz im Leben* of the later collections of physical *Plac.*¹⁶ Lists of tenets already circulated in the period of the Sophists, and Plato already used such lists and made additions to them in what—in an Aristotelian sense of the word—one may call dialectical passages in the dialogues.¹⁷ Aristotle's use of the δόξαι of other experts in the dialectical sections of the *πραγματεῖαι* has been rather thoroughly studied. What is less familiar is that in his *Topics* he discloses those purposes for which one should note down tenets, and that he gave precise directions as to how one should proceed.

According to Aristotle, δόξαι are relevant in the context of *problems*. In order to discuss, inquire into, state in an adequate way, and solve problems one should first find out what the exact nature of the question at issue is, and next take the views of others into account. Of course a problem arises in the first place whenever different views about a given matter are current, or whenever alternatives can be formulated by the conscientious inquirer. Problems and their solution are what the various philosophical disciplines are concerned with. Furthermore, what holds for the problems which are discussed in science also holds for the *propositions* which are the starting-point of dialectical debate, or discussion. Aristotelian dialectical techniques can be used in two ways, viz. either for the purpose of training or in order to further the formulation and discussion of problems in theoretical scientific research. Theophrastus' collection of Φυσικαὶ δόξαι in eighteen books, I suggest, was composed in order to assemble the materials one would need. I further argue that in this treatise he also provided counter-arguments to the positions supported by others.

We are however faced with a major problem, because the attested remains of the *Physical Tenets* are few.¹⁸ It is most odd that Diels speculated about

di lettura dell'Anonimo Londinese - Prolegomena ad una nuova edizione", *ZPE* 63 (1986), 57 ff., and her note on the papyrus and its contents at *Corpus dei papiri filosofici greci e latini* (CPF), Parte I: *Autori noti*, Vol.1 1*, Firenze: Leo S. Olschki Editore 1989, 345 ff., where she argues that the attribution to 'Meno' is merely an ancient guess, to be compared to, e.g., the attribution of the *Nicomachean Ethics* to Nicomachus (Cic., *De fin.* V 12), and that the work—as Galen admits—circulated as one by Aristotle. This sounds fair enough; however, if the title of the work—composed by either Aristotle or one of his early pupils—originally was 'Ἰατρικὰ Μενώνεια, Meno must have been as real a person as Nicomachus.

¹⁶ Cf. my paper cited *supra*, n. 11.

¹⁷ See J. Mansfeld, "Aristotle, Plato, and the Preplatonic Doxography and Chronography", in G. Cambiano (ed.), *Storiografia e dossografia nella filosofia antica*, Torino: Tirrenia Stampatori 1986, 23 ff.; cf. also *infra*, n. 88, n. 123.

¹⁸ Cf. *supra*, n. 7. I refrain from discussing the *De sensibus*, on which J. N. M. Baltussen is currently writing his Utrecht dissertation.

the lost *Einzelquelle* but failed to inquire into Aristotle's theory involving the use of δόξαι, and moreover refrained from comparing the numerous doxographic passages in Aristotle—i.e. the dialectical sections in the *πραγματεῖαι*—with the remains of the *Plac.* literature. Parallels between Aristotle and Aëtius as to the actual contents of certain sections are too numerous to be the result of contamination after the publication of the school-writings by Andronicus.¹⁹ The lay-out of the later *Plac.* moreover conforms to the rules laid down by Aristotle. One may therefore assume that Theophrastus is important as an intermediary source between Aristotle and the *Plac.* The best working hypothesis available at the moment is that Theophrastus set about collecting the materials in a systematic and complete way²⁰ and made this collection available to colleagues and pupils, whereas Aristotle compiled an overview of tenets whenever the need arose in the context of a scientific discussion (he may of course have made such overviews for his private use when working on one of his *πραγματεῖαι*). The lost monographs and epitomes dealing with individual philosophers listed in the bibliographies of both Aristotle and Theophrastus may have served as intermediary source material.

It is part of Aristotle's method in the school-writings, when engaged in the dialectical discussion of a topic or a problem, to avail himself from time to time of the method of diaeresis in order to provide an orderly overview of the δόξαι that are relevant, and to stipulate what are the disagreements and what the views which are held in common. This technique was used by Theophrastus as well; the instance that is probably most familiar is the diaeresis, in the *De sensibus*, between those who hold that perception is of like by like and those who hold that it is of unlike by unlike. In the *Plac.* literature, too, the δόξαι are arranged according to a diaeretic pattern,²¹ and each separate chapter as a rule is concerned with a specific problem in natural philosophy. Elsewhere, I argue that a predecessor, or several predecessors, of the *Vet. plac.* was/were compiled by the pupils of the Skeptical Academic Arcesilaus, who plundered Theophrastus' collection of physical δόξαι but by no means this collection only, and who used the method of διαίρεσις not for training purposes only, let alone in order to further the solution of a problem in philosophy or science, but in order to produce a deadlock, viz. an ἀντιλογία, or διαφωνία.²² As a matter of fact, the remains of the *Vet. plac.*, and the chapters of the *Plac.* of Aëtius that survive, most of

¹⁹ For examples of such contamination recognized by Diels see *DG* 180 f., 215 f.

²⁰ Using Aristotle's school-writings, other compilations that were available, and the original works of the natural philosophers (and presumably of some doctors).

²¹ See D. T. Runia, "Xenophanes On the Moon: a *doxographicum* in Aëtius", *Phronesis* 34 (1989), 245 ff.; D. T. Runia, "Xenophanes or Theophrastus? An Aëtian *doxographicum* on the Sun", following in this volume; and my paper cited *supra*, n. 11.

²² See J. Mansfeld, "Chrysippus and the *Placita*", *Phronesis* 34 (1989), 311 ff., and my paper cited *supra*, n. 11.

the time present the δόξαι in such a way that although the diaeresis is far from complete the *diaphonia* is brought out quite effectively.

According to Aristotle, the person who embarks on the discussion of a problem should proceed in an orderly way. He should establish what the γένος of the matter is, i.e., whether it is a question in one of the theoretical disciplines, such as physics, or in ethics. Furthermore, various aspects must be distinguished and treated separately, viz. whether or not the object of the inquiry has a certain attribute or not, the reason why it has this attribute, the existence or non-existence of the object of the inquiry, and its substance or definition. The categories play a crucial part in this connection, because it is of major importance to establish to what category (substance, or quality, or quantity, or place, etc.) the object of inquiry and its attributes belong. Locomotion, for instance, belongs with the category of quantity or with that of place,²³ shape (σχῆμα) with that of quality,²⁴ and motion/change in a more general sense may belong with the categories of doing and being affected.

Discussions of problems in Aristotle's school-writings often avail themselves of varieties of this check-list, for instance in the *Cael.*²⁵ We shall see that clusters of chapters in the *Plac.* are structured according to this methodology.

In a passage in the *Rhetoric* Aristotle advises the student of rhetoric to employ such a check-list as well. This passage clearly was seized upon by the rhetoricians and so acquired an importance that is quite out of proportion to its modest original position. Hellenistic and later theories of στάσεις are heavily dependent on this Aristotelian methodology. The rhetoricians moreover accepted Aristotle's distinction between theoretical and practical issues as defined in the *Topics* (so this work did not lie unread in the cellar at Skepsis).²⁶ But they refined this by making a further distinction between the general, or theoretical, practical issue and the particular practical issue which is the proper domain of the orator; or rather between the general theoretical issues, or θέσεις, that are the domain of the philosophers in both natural philosophy and ethics, and the particular issues, or ὑποθέσεις, which the orator has to deal with. Cicero here is an important source of information, but he is not the only one. As we shall see, instances of such general theoretical issues in the field of physics provided by Cicero and other rhetoricians quite often coincide with the titles and subject-matter of individual chapters in the *Plac.*

²³ See *Cat.* 6 5b3, 14 15a14.

²⁴ See *Cat.* 8 10a11 ff.

²⁵ For existence, the that, and the why in the *Cael.* see P. Moraux, *Aristote: Du ciel*, Paris: Les Belles Lettres 1965, CX ff. For *Cael.* B 13 see *infra*, § VII.

²⁶ One may object that they used Theophrastus' *Topics* rather than Aristotle's, but the original copy of Theophrastus' *Topics* must have been in the cellar too. But even if they used Theophrastus rather than Aristotle, they must have used a part of Theophrastus that can no longer be distinguished from the corresponding part of Aristotle.

Some information is also forthcoming from the so-called *Divisiones Aristoteleae*, a little scholastic handbook to be dated before Diogenes Laertius, who quotes substantial chunks in the section of the *Lives* devoted to Plato (book III). The proem of ps.-Plutarch, which explains the notion of physics—the subject of the work according to the very first words: μέλλοντες τὸν φυσικὸν παραδῶσθαι λόγον—as a part of philosophy, is of primary importance, because ps.-Plutarch emphasizes the division of philosophy into the theoretical and the practical according to “Aristotle, Theophrastus and almost all the Peripatetics”, and provides three examples of theoretical *problems* in physics, two of which correspond with the issues of chapters in the body of the *Placita*. Another important source of information is Galen in his *De placitiis Hippocratis et Platonis*. Galen speaks at some length about the distinction between issues that are purely theoretical and so of no practical use, and others that are useful to the practising physician, or politician, or householder. His instances of useless issues coincide with topics to be found in the *Placita*; one of Galen’s reasons for believing that they are useless is that the dispute about them has not (yet) been, or rather never will be, settled. *Diaphonia* again.

In the pages that follow, I shall present evidence to support the claims made in the present section.

III. ARISTOTLE ON TYPES OF QUESTIONS CONCERNED WITH PROBLEMS, AND ON ΔΟΞΑΙ

The *locus classicus* concerned with the four main types of inquiry, or four main questions that should be formulated at the beginning of an investigation, is at Arist. *APo.* B 1.89b24-35:²⁷

²⁷ One may compare David, *Proleg. philos.* 1.13 ff., ‘Αριστοτελικοῖς πειθομένῳ θεσμοῖς ὥς δεῖ ἐν ἐκάστῳ σχεδὸν πράγματι τὰ δ’ ταῦτα ζητεῖν κεφάλαια· εἰ ἔστι [existence], τί ἔστι [substance/definition], ὁποῖόν τί ἔστι [quality] καὶ διὰ τί ἔστι [cause]. So also Elias *Proleg. philos.* 3.3-6, ἐπομένους νόμῳ διαλεκτικῇ τῷ λέγοντι δεῖν ἐπὶ πάσης τέχνης καὶ ἐπιστήμης τέσσαρα προβλήματα ζητεῖν, εἰ ἔστι, τί ἔστιν, ὁποῖόν τί ἔστι καὶ διὰ τί ἔστι. This is echoed at ‘Trophonius’ *ap.* Rabe, *Proleg. syll.* 1.2; cf. also *ibid.*, 14.7-8, 158.11-2. A number of other parallels are quoted by H. Rabe, “Aus Rhetorenhandschriften”, *Rhein. Mus.* 64 (1909), 543. Note that David, Elias, and others under the influence of later developments (as attested, e.g., by the *stasis* doctrine) list the main types of inquiry in a sequence which differs from Aristotle’s original one and which is indeed easier to understand. At *Top.* A 13 (quoted *infra*) Aristotle says one has to begin with the what it is.

A somewhat different list according to the categories (for which see below) is in Arius Didymus *ap.* Stob. II 42.1-6 W.: ἡγούμενος δ’ ἐμαντῷ πρέπειν πρὸ παντὸς τὴν οὐσίαν δεῖν ἐπισκοπεῖν οὗ τις πραγματεύεται, κάπειτα ποιότητα τὴν περὶ αὐτὴν καὶ ποσότητα, καὶ τούτοις ἐφεξῆς τὸ πρὸς τι, νομίζω προσεπινοητέον εἶναι καὶ τὰ τῶν ἄλλων ἐπισκοπεῖν, καθάπερ οὐ πάντων, οὕτως τῶν περὶ ταῦτα διανεγκάντων. We should note the emphasis on the overviews of the warring opinions (*diaphonia*); cf. *infra*, § VII.

“We seek four things: the that [τὸ ὅτι: fact/quality—attribute²⁸], the why [τὸ διότι: cause²⁹], if it exists [εἰ ἔστι], what it is [τί ἐστι: substance/definition]. For when we seek whether this or this, ..., e.g. whether the sun is eclipsed³⁰ or not, what we seek is the that. Evidence for this: on finding that (the sun) is eclipsed we stop, and if from the start we (already) know that it is eclipsed we do not seek whether. When we know the that, we seek the why, e.g. knowing that it is eclipsed, and that the earth moves [?], we seek why it is eclipsed, and why it moves [?].³¹ Now while we seek these things in this way, we seek some things in another way—e.g. if a centaur³² or a god is [i.e. exists] or not; I mean if one is or not *simpliciter* and not if one is white or not. And knowing that it exists, we seek what it is, e.g. what is a god? or what is a man?³³

Aristotle here says that the four types of question are divided into subsets of two questions each, and that these must be applied to different kinds of topics.³⁴

²⁸ Note that David and Elias (see previous n.) explain ὅτι as ὁποῖόν τι.

²⁹ This may coincide with definition; cf. *APo.* B 2 90a14-15, “in all those cases it is clear that the what it is is the same as the why it is”.

³⁰ This example corresponds with the theme of a chapter in *Aët.*: II 24, περὶ ἐκλείψεως ἡλίου (cf. *infra*, text to n. 120).

³¹ Because according to Aristotle the earth does not move (see *infra*, § VII), one should probably both times insert <μή> before κινεῖται.

³² For the centaur as one of the emblems of the nonexistent see G. Silliti, “Tragelaphos. Storia di una metafora e di un problema”, *Elenchos* 2, Napoli: Bibliopolis 1980.

³³ The questions εἰ ἔστιν and τί ἐστιν in relation to the divine are the theme of *Aët.* I 7 (see below); for their presence in a page of Galen see *infra*, text to n. 117. Cf. also *infra*, text to n. 69, text to n. 95.

³⁴ Alex. of Aphrodisias attempts to make another division into subsets, *In Top.* 62.30 ff. (with *Arist. fr.* 112 Rose³, also printed at W. D. Ross, *Aristotelis fragmenta selecta*, Oxford: Clarendon Press 1955, 100 f.; *fr.* 112 Gigon, cf. *infra*, n. 83). Alexander, referring to Aristotle’s lost *Περὶ προβλημάτων*, first points out that physical problems dealing with the question διὰ τί are not dialectical, but adds, 63.13-9: γίνεται μὲν οὖν καὶ διαλεκτικὰ προβλήματα περὶ φυσικῶν, ὥσπεροῦν καὶ περὶ ἠθικῶν τε καὶ λογικῶν, ἀλλὰ τὰ μὲν ἐκείνως ἔχοντα διαλεκτικά, τὰ δὲ οὕτως φυσικά. καὶ εἴη ἂν τὰ διαλεκτικὰ προβλήματα πάντα ἀναγόμενα εἰς τὴν ζήτησιν τοῦ τε ὅτι ἐστι καὶ τοῦ εἰ ἔστιν, ἃ ἐστὶ δύο τῶν τεσσάρων [reference to *APo.* B 1.89b24 ff. follows]: τὸ γὰρ δι’ ὃ τί ἐστὶ καὶ τί ἐστὶν οὐ διαλεκτικὰ προβλήματα. Cf. *ibid.*, 294.14-6, ζητεῖν μὲν γὰρ εἰ ὅδε ὁ λόγος ὁρισμός ἐστιν ψυχῆς διαλεκτικόν· τὸ δὲ τίς ἐστὶν [...] οὐ διαλεκτικόν. Accordingly, the same question-type, or aspect of an issue, may be treated in a dialectical as well as in a scientific way. See H. Throm, *Die Thesis. Ein Beitrag zu ihrer Entstehung und Geschichte*, Rhetorische Studien H. 17, Paderborn: Ferd. Schöningh 1932, 74 ff. I think that Alexander’s problem is that Aristotelian collections of *Problemata* existed (each of which as a rule is introduced by the formula διὰ τί) which are not dialectical in the gymnastic sense, a solution being quite often provided. Note that in the surviving *Problemata* individual problems may also be introduced by formulas which denote what later came to be called a *peristasis*, such as ἐν τίνι (= “ubi”) or πῶς (= “quomodo”); see further below.

We shall see presently that later authors tend to put them on a par and to assume that in principle they are all equally applicable to whatever topic you may encounter, although it is not always necessary to deal with each separate question. Aristotle himself, as we shall see and as is appropriate for someone who thinks as he writes and comes up with original ideas, uses the types of inquiry in different ways in different contexts.

One should moreover note that in the passage from *APo.* B 1 quoted above the question concerned with the “that” is put in the “whether ... , or not” form, i.e. is formulated as a disjunctive question, and that the example of such a question provided by Aristotle is an issue in the domain of *physics*. The question “if it exists” may of course be stated in the same form: “if it exists, or not”. But also the other questions may be formulated more fully. The question “what it is” allows for a whole series of alternatives: “is it *p*, or *q*, or ... ?”, and need not—as in the two instances, man and god, provided by Aristotle as quoted above—be restricted to the category of substance. The question “why”, too, opens up a larger perspective: “is it so because of *x*, or of *y*, or ... ?” When alternatives are possible, the available δόξαι that are relevant may be taken into consideration.

Aristotle is quite clear that one need not always put all the questions. As to the ὅτι and the διότι, he says in the passage quoted above dealing with the eclipse that when you already know the “that” you immediately ask for the “why”. A converse instance may be quoted from an ethical context; here Aristotle says that only the questions concerned with the “that” are relevant and those concerned with the “why” are not (*Eth. Nic.* A 4 1095b6 ff.³⁵).

We may now turn to two important passages in the *Topics*. In the first of these, *Top.* A 11 104b1-8, Aristotle gives a descriptive definition of the dialectical problem:

A dialectical problem [πρόβλημα ... διαλεκτικόν] is a theorem which pertains either [genus *a*] to choice and avoidance, or [genus *b*] to truth and knowledge [ἀλήθειαν καὶ γνῶσιν] ... , on which *either* people have no point of view either way, *or* the many have a point of view that is contrary to that of the experts, *or* the experts one that is contrary to that of the many, *or* both the experts and the many disagree among themselves.³⁶ For, the understanding of some problems is useful with a view to choice and avoidance, e.g. whether pleasure is to be chosen or not, and that of others with a view to knowledge only, e.g. whether the cosmos is eternal or not [πότερον ὁ κόσμος αἰδῖος ἢ οὐ].³⁷

³⁵ ἀρχὴ γὰρ τὸ ὅτι, καὶ εἰ τοῦτο φαίνοιτο ἀρκοῦντως, οὐδὲν προσδεήσει τοῦ διότι.

³⁶ This was later interpreted as and/or developed by the Skeptical Academics into the *diaphonia*, or the inconclusive argument on both sides of an issue.

³⁷ This is taken up at *Arist. Cael.* A 10 297b3-6, ... λέγωμεν μετὰ ταῦτα πότερον ἀγένητος ἢ γεννητός καὶ ἀφθαρτός ἢ φθαρτός [scil., ὁ κόσμος], διεξεληθόντες πρότερον τὰς τῶν ἄλλων ὑπολήψεις (extensive dialectical discussion follows). It is the theme

Dialectical problems are of two kinds, viz. practical (i.e. pertaining to the practical disciplines) and theoretical (i.e. pertaining to the theoretical disciplines). A problem is here described as an issue about which the experts, or men in general, either have not made up their mind as to the alternatives that exist, or disagree with one another or among themselves. Aristotle gives examples for both kinds of problems; both times, these clearly belong to the type of question concerned with the “that”, or attribute, defined at *APo.* B 1: “whether ... , or not”. The first of these pertains to ethics, the second to physics.

At *Top.* A 14, Aristotle tells us how one should select propositions which are to be debated. The distinction between practical and theoretical issues is taken up again;³⁸ instances from the domains of (a) ethics, (b) zoology/physics, and (c) logic are provided. I quote the text of 105a34-36 + b12-25:

Propositions [προτάσεις] should be selected in as many ways as we drew distinctions in regard to the proposition. Thus one may select the tenets [δόξας] held by all or by the majority or by the experts.³⁹ ... We should also make selections from the existing literature and put these in separate lists [διαγραφάς] concerned with every kind [περὶ ἐκάστου γένους], putting them down under separate headings, for instance about the good, or about the living being—and that is to say about the good as a whole, beginning with the: What is it? [περὶ ἀγαθοῦ πάντος, ἀρξάμενον ἀπὸ τοῦ τί ἐστίν].⁴⁰ One should indicate separately the tenets of individuals [παρασημαίνεισθαι δὲ καὶ τὰς ἐκάστων δόξας], e.g. that Empedocles said that the elements of bodies are four.⁴¹

Aristotle then distinguishes three kinds of propositions, and explicitly states that what holds for propositions also holds for problems:

... Of propositions and problems [τῶν προτάσεων καὶ τῶν προβλημάτων] there are, roughly speaking, three sorts: for some are ethical propositions, others physical,

of a chapter in *Aët.*: II 4, εἰ ἄφθαρτος ὁ κόσμος. Cf. D. T. Runia, “Philo’s *De aeternitate mundi*: The Problem of its Interpretation”, *Vig. Christ.* 35 (1981), 115 ff., esp. 118 and n. 50. See further below.

³⁸ This aspect of the distinction between these genera is of primary importance in Aristotle’s ethics. At *Eth. Nic.* A 1 1095a6 he says: τὸ τέλος ἐστὶν οὐ γνώσις ἀλλὰ πρᾶξις; *ibid.* B 2 1103b26 ff., he tells us that ἡ παρούσα πραγματεία οὐ θεωρίας ἕνεκά ἐστιν ὥσπερ αἱ ἄλλαι—for we do not inquire in order to know what virtue is (τί ἐστὶν ἡ ἀρετή) but in order to become virtuous. For Aristotle, ethical problems as a rule have an immediate relevance to action, although he is of course aware that they also may, and must, be treated in a theoretical way. For the parallel at *Aët.* proem 1.3 see *infra*, § V; for those in Cicero *infra*, § IV.

³⁹ Cf. the passage from *Top.* A 11 quoted above.

⁴⁰ For the good cf. *Eth. Nic.* A 5 1097a15 f., πάλιν δ’ ἐπανελάθωμεν ἐπὶ τὸ ζητούμενον ἀγαθόν, τί ποτ’ ἂν εἴη.

⁴¹ Cf. *Aët.* I 3.20, Ἐμπεδοκλῆς ... τέτταρα μὲν λέγει στοιχεῖα.

and others logical. Ethical are such as, e.g., whether one should rather obey one's parents or the law, if they disagree, logical, e.g., whether the knowledge of opposites is the same or not, physical, e.g., whether the cosmos is eternal or not [πότερον ὁ κόσμος αἰδῖος ἢ οὐ].⁴² The same holds for problems.

The first thing to be noted is that these examples for propositions/problems in physics and logic are concerned with the question-type of the "that" as defined at *APo.* A 1: "whether ... , or not".⁴³ The second is that the subjects to be debated and scrutinized are to be investigated *whole*. Aristotle in the present case takes existence for granted,⁴⁴ for when speaking about the issues concerned with the good he says that one has to start with the question "What is it?". It is clear that one should go on inquiring about the attributes, for if one has *to begin with* the question of substance, or definition, and should cover the subject *in full*, further questions are to follow. For the domain of physics, Aristotle here provides an example of such a question in the category of *quantity* (four elements). Moreover, he says that when doing this one should add the tenets (*doxai*!) of individuals. In other words, one should first establish the genus one is dealing with; next, to take the problem given by Aristotle as an example, one should start with inquiring *what* a corporeal element *is* (believed to be), and add notes—which for the sake of convenience may include name-labels—on the various views concerned with the *number* of the various corporeal elements that have been assumed.⁴⁵ The fact that the problem and the genus come first and that the *doxai* and names come next and depend on the problem is highly important. These invaluable passages in the *Topics* provide an indispensable insight into the origin of accumulations of *placita* in the Early Peripatos.⁴⁶

⁴² The same example of a problem in physics as in *Top.* A 11; cf. *supra*, text to n. 37.

⁴³ The proposition/problem in ethics can be battered into the same shape.

⁴⁴ One may quote a case where he does not. The question-types impart structure to the dialectical discussion of place (τόπος) in the *Physics*. In the first sentence of *Phys.* Δ, 1.208a28-9, Aristotle states that, as regards place, the φυσικός should know εἰ ἔστιν ἢ μὴ [this is because Zeno of Elea denied that place exists], καὶ πῶς ἔστι ("what kind of existence it has"—a corollary), καὶ τί ἐστίν. Its existence is then proved but its manner of existence and definition remain difficult. See K. A. Algra, *Concepts of Space in Classical and Hellenistic Greek Philosophy*, Diss. Utrecht 1988, 112 ff., esp. 123 ff., who provides a detailed analysis of the dialectical argument of *Phys.* Δ 1-5.

⁴⁵ Cf. *De an.* A 2.404a10, τίνες καὶ πόσαι; *De gen. corr.* A 1.338a23-4, περὶ τῶν στοιχείων τῶν σωματικῶν, πόσα τε καὶ ποῖα. For the division at *Phys.* A 2 see below.

⁴⁶ Cf. Throm's comment on this passage, *op. cit.* (*supra*, n. 34), 69: "Man soll sich also einen regelrechten Zettelkasten anlegen, natürlich für praktische Verwertung"; see also A. Beriger, *Die aristotelische Dialektik: Ihre Darstellung in der Topik und in den Sophistischen Widerlegungen und ihre Anwendung in der Metaphysik M 1-3*, Beiträge zur Philosophie NF, Heidelberg: Carl Winter 1989, 40 f. Such collections are at the basis of Aristotle's dialectical discussions in the *Lehrschriften*. We may quote instances

I have pointed out above that Aristotle may present the various views concerned with an issue in science in the form of a diaeresis. A famous and for Aristotle basic⁴⁷ diaeresis concerned with the *quantity*, the *substance*, and the *motion* of the physical elements—including here and there τὰς ἐκάστων δόξας—is found at *Phys.* A 2.184b15-21:

It is necessary that the principle is either one or more (than one), and if one, either unmoved as Parmenides says and Melissus, or moved as the natural philosophers (say), some saying that the first principle is air, others that it is water.⁴⁸ If more than one, either finitely or infinitely many; and if finitely many and more than one, either two or three or four or another number, and if infinitely many, then in the manner of Democritus ... , or ... , or⁴⁹

The question-types are also at issue at *De an.* A 1.402a6-7, “the aim of our inquiry is to study and understand its (scil., the soul’s) nature and substance, and secondly its accidents”. That the soul exists is taken for granted. Its definition/substance is to be the first subject to be investigated; the inquiry into its accidents according to the other categories is to follow. The soul’s substance⁵⁰ and what

for the genera of ethics and physics. Ethics (genus *a*, see above): *Eth. Nic.* A 2.1095a18 ff., on happiness and the good as both similarly and variously conceived by the many and the experts, esp. a29-30: ἀπάσας μὲν οὖν ἐξετάζειν τὰς δόξας ματαιώτερον ἴσως ἐστίν, ἱκανὸν δὲ τὰς μάλιστα ἐπιπολαζούσας ἢ δοκοῦσας ἔχειν τινα λόγον. Cf. *ibid.* 4.1096a17, οἱ δὲ κομίσαντες τὴν δόξαν ταύτην; 8.1098b9-11, σκεπτέον δὲ περὶ αὐτῆς οὐ μόνον [...], ἀλλὰ καὶ ἐκ τῶν λεγομένων περὶ αὐτῆς; 8.1098b16-8, ὥστε καλῶς ἂν λέγοιτο κατὰ γε ταύτην τὴν δόξαν παλαιὰν οὖσαν καὶ ὁμολογουμένην ὑπὸ τῶν φιλοσοφούντων. Physics: (genus *b*): *Met.* A 3.983b32-84a2 (water as the principle in the ancient poets according to some experts), εἰ μὲν οὖν ἀρχαία τις αὕτη καὶ παλαιὰ τετύχηκεν οὖσα περὶ τῆς φύσεως ἡ δόξα, τάχ’ ἂν ἄδηλον εἴη. *De an.* A 2.403b21-4, τὰς τῶν προτέρων δόξας συμπαραλαμβάνειν ὅσοι τι περὶ αὐτῆς (scil., τῆς ψυχῆς) ἀπεφώνησαν, ὅπως τὰ μὲν καλῶς εἰρημένα λάβωμεν, εἰ δέ τι μὴ καλῶς, τοῦτ’ εὐλαβεσθῶμεν.

⁴⁷ See O. Gilbert, “Aristoteles und die Vorsokratiker”, *Philol.* 68 (1909), 368 ff. and *infra*, n. 49.

⁴⁸ Alternatives in the category of substance.

⁴⁹ On this diaeresis see, e.g., my paper cited *supra* n. 17, 7 ff., where I also discuss its predecessors in Gorgias, Isocrates, Plato, and Xenophon. It was applied and further refined by Theophrastus and Eudemos, see my paper (*supra*, n. 7), 138 ff. Further parallels: e.g. *Lucr.* I 705-15, *Sext. P.* III 30-2, *M. IX* 359-64 (cf. *ps.-Gal. Philos. hist.* ch. 18), *M. X* 310-18 (cf. *Hipp. Ref. X* 6.2-7.6).

⁵⁰ The question What is it? is at *De an.* A 1 further specified as the question to what category the soul belongs, *ibid.* 402a23-5, πρῶτον δ’ ἴσως ἀναγκαῖον διελεῖν ἐν τίνι τῶν γενῶν καὶ τί ἐστι, λέγω δὲ πότερον τόδε τι καὶ οὐσία, ἢ ποιόν, ἢ ποσόν, ἢ καὶ τις ἄλλη τῶν διαιρεθειῶν κατηγορίων. See further my paper cited *supra* (n. 11), 3193 ff., 3208 ff., 3212 ff., where I deal at some length with the antecedents in Aristotle for Aët. IV 2-7.

may be, or has been, attributed to it are the subject of the inquiry which in *De an.* A 2 ff. begins with a dialectical discussion involving the views of other experts. It is clear that for Aristotle himself the question-types may to a certain extent overlap with the categories.

According to the famous opening words of Aristotle's *Rhetoric*, this art is the counterpart of dialectic. I need not describe in detail here that one of Aristotle's points is that the forms of argument one uses, or should use, in rhetoric are similar to those one uses in dialectic, the paradigm corresponding to induction and the enthymeme to the syllogism; at *Rhet.* A 2.1356b12 ff. he refers to the *Topics*, i.e. to *Top.* A 12. An important observation concerning the resemblance between rhetoric and dialectic is found at *Rhet.* A 2.1358a1 ff. Aristotle here makes a distinction between general *topoi* and those which apply to specific fields of inquiry. Some *topoi*—such as that of the more or the less—apply equally to questions about what is just or what is physical or political or whatever. Others, however (1358a17 ff.),

are based on such propositions as apply only to a particular species or genus [ἐκ τῶν περὶ ἑκάστων εἶδος καὶ γένος ἐστίν]. Thus there are propositions about matters in the domain of physics on which it is impossible to base any enthymeme or syllogism on ethical matters, and other propositions in the latter (domain, scil., of ethics) on which nothing can be based on physical matters.

We may note that the distinction between the different genera and the corresponding types of propositions which is of major importance in Aristotle's dialectic is here argued again. Students of Aristotle's *Rhetoric* were therefore in a position to be informed about these things. The explicit references in the *Rhetoric* to the *Topics* (and to the *Analytics*) were also there to be exploited. A succinct but substantial survey of the *topoi* of the *Topics* is found at *Rhet.* B 23. We need therefore not be surprised that the professional rhetoricians have been decisively influenced by Aristotle's theory of invention, as it came to be called.

IV. PROBLEMS AND TYPES OF QUESTION IN RHETORICAL THEORY

At *Rhet.* Γ 16.1416b20-1 Aristotle speaks of epideictic oratory. Part thereof is provided not by the orator but by the art; that is to say "the demonstration that it [scil., the event at issue] exists [ὅτι ἔσται]⁵¹—when this is in doubt—, or

⁵¹ Note that Aristotle's terminology is not always the same; the ὅτι ἔσται—translated "an sit" by Quintilian, see *infra*—here does not pertain to the attributes but to existence (elsewhere indicated by the εἰ ἔσται). The reason may be that the existence of events is much less a matter of speculative theory than that of place, or of the aether, or of a god.

that (it is of a certain) quality [ποιόν], or that (it is of a certain) quantity [ποσόν], or even all these three together".⁵² The affinity of this division with that of the kinds of inquiry in science and dialectic is obvious. One may note, however, that the question pertaining to the definition is not included in this passage, and that the question of the "that" is subdivided into questions concerned with the categories of quality and quantity (or importance).

The passage is cited by Quintilian. In his historical report about the views on στάσις ("type of controversy") of diverse rhetorical authorities at *Instit. orat.* III 6—far too long to quote entire⁵³—, he cites "Aristoteles in Rhetoricis" who, he says, distinguished "(a) an sit, (b) quale", and "(c) quantum et quam multum sit" (6.49). I have pointed out that in the passage in the *Rhet.* the question regarding the definition is lacking. Quintilian however—no doubt indebted to his Greek predecessors—finds it attested elsewhere in the *Rhet.*, for he continues: "quodam tamen loco (d) finitionis [definition] quoque vim intellegit, quo dicit quaedam sic defendi: 'sustuli, sed non furtum feci, percussi, sed non iniuriam feci'".⁵⁴ The reason why evidence for the question concerned with the definition was sought in the *Rhet.* is obvious, viz., the need to have the doctrine of this work agree with the directions for scientific research given at *APo.* B 1. It is, however, clear that the theory in the *APo.* was the starting-point for this interpretative move, and not the other way round.⁵⁵ The appeal to Aristotle,

⁵² For what follows cf. Throm, *op. cit.* (*supra*, n. 34), *passim*; B. Riposati, *Studi sui 'Topica' di Cicerone*, Ed. dell' Università del Sacro Cuore, Ser. pubblicaz. 22, Milano: Società Editrice <<Vita e Pensiero>> 1947, 182-204, and Runia, *op. cit.* (*supra*, n. 37). Both Riposati and Runia cite further literature. For Hermagoras see D. Matthes, "Hermagoras von Temnos 1904-1955", *Lustrum* 3 (1958), 58 ff. (the fragments have been edited by him as well, *Hermagorae Temnitae Fragmenta*, Leipzig: B. G. Teubner 1962). On the theory of στάσις see R. Nadeau, "Classical Systems of Stases in Greek: Hermagoras to Hermogenes", *GRBS* 2 (1959), 53 ff., and L. Calboli Montefusco, *La dottrina degli 'status' nella retorica greca e romana*, Hildesheim: Olms 1986. On the precedents of the *stasis* doctrine in Aristotle see the various suggestions of O. A. L. Dieter, *Stasis*, Speech Monographs 17 (1950), 345 ff.; R. Nadeau, *Hermogenes' On Stases: A Translation with an Introduction and Notes*, Speech Monographs 31 (1964), 370 ff.; and W. N. Thompson, "Stasis in Aristotle's Rhetoric", *Quart. Journ. of Speech* 58 (1972), 134 ff. For the Peripatetic and Academic background of the distinction between θέσις and ὑπόθεσις see K. Barwick, *Das rednerische Bildungsideal Ciceros*, Abh.Ak.Leipz. Phil.-hist. Kl. 54.3, Berlin 1963, 51 ff., and Calboli Montefusco, *op. cit.*, 36, 42 ff.

⁵³ See the convenient overview of E. B. Holtsmark, "Quintilian on Status: A Progymnasma", *Hermes* 96 (1968), 356 ff. Passages in which Quintilian provides examples from natural philosophy for various types of questions are quoted by A. S. Pease, *Cicero De divinatione*, repr. Darmstadt: Wissenschaftliche Buchgesellschaft 1977, 361.

⁵⁴ The reference is to another book of the *Rhet.*, viz. A 13.1374a22-3, λαβεῖν μὲν ἄλλ' οὐχ ὑβρίσαι κτλ.

⁵⁵ The categories are present as well; earlier in the same chapter Quintilian points out: "... primum Aristoteles elementa decem constituit, circa quae versari videtur omnis quaestio: οὐσίαν, quam Plautus essentiam vocat [...], sed ea quaeritur an sit, qualitatem

and the use of his methodology, aims at constituting rhetoric as a scientific discipline and so belongs within the context of the ancient rivalry between philosophy and rhetoric.

One may look at the theoretical side of the rhetorical doctrine of στάσις and at its historical roots in the Aristotelian methodology described in the previous sections. One may begin by considering some passages containing a technical description to be found in rhetorical works of Cicero, who is our earliest complete source. At *Top.* 81-2, he distinguishes between theoretical and practical problems: "*quaestionum ... sunt duo genera: unum cognitionis alterum actionis*".⁵⁶ Theoretical questions are those whose purpose is knowledge ("*finis est scientia*"). These questions are threefold: "one asks either Does it exist? or What is it? or What is its quality? (*aut sitne aut quid sit aut quale sit*)". The first of these is settled by inference (*coniectura*, i.e., στοχασμός⁵⁷), the second by definition, and the third by distinguishing between right and wrong.⁵⁸ Inference itself is divided into four parts, or species, of which only the first three are of interest to us here. The first of these—which actually is hard to distinguish from the first general type of theoretical question—is again "*sitne aliquid*", and the second is "*unde ortum sit*", the third being what cause produced it, and the fourth what changes can be made in it. At *De orat.* III 113-4 Cicero again explains the tripartition of the scientific questions, the first again being inference ("*quid in re sit coniectura quaeritur, ut illud: sitne ... ?*"). Inference is then again divided into four: "*aut quid sit quaeritur, ... aut quae sit origo cuiusque rei*", etc. Of particular interest is a passage in the *Orat.*, 45-6.⁵⁹ Here it becomes clear that for Cicero θέσις is the Greek equivalent for both the practical and the theoretical kinds of general question, and that he attributes the invention of this practice to Aristotle. In all controversial matters, Cicero says, the questions one must ask are: "*aut sitne aut quid sit aut quale sit*"; such an inquiry, which has nothing to do with (particular) persons and particular times but is general in character,⁶⁰ "*appellatur θέσις*".

[...], *quantitatem, quae dupliciter a posterioribus divisa est: quam magnum et quam multum sit*", etc. (6.23-4). Note that Quintilian here follows the sequence of the categories (first quality, than quantity) which became prominent after Eudorus; cf. P. Moraux, *Der Aristotelismus bei den Griechen*, II: *Der Aristotelismus im I. und II. Jh. n. Chr.*, Peripatoi 6, Berlin - New York: W. de Gruyter 1983, 485 ff. Quintilian's list, too long to quote, is complete, that is to say, it includes, e.g., place (the ποῦ, or "*ubi*"). The analysis according to question-types and that according to categories to a certain extent overlap; or rather, some of the στάσεις and περιστάσεις that are usually at issue according to the rhetorical theory in fact coincide with some of the canonical ten categories.

⁵⁶ This primary distinction derives from Aristotle's *Topics*, see *supra*, § III.

⁵⁷ Cf. *infra*, n. 77.

⁵⁸ This limitation is mentioned because of the juridical context.

⁵⁹ See also below.

⁶⁰ Cf. *infra*, n. 61.

What Cicero offers here belongs with the doctrine of στάσις which seems to have been first presented in a systematic form by Hermagoras of Temnos in the 2nd century BCE.⁶¹ Hermagoras formulated the main distinction between the general question (θέσις, *quaestio infinita*) which is not concerned with particulars, and the specific question (ὑπόθεσις, *quaestio finita*) which is concerned with particulars and which constitutes the proper domain of oratory as actually practised. The ὑπόθεσις is characterized by particular circumstances (περιστάσεις) pertaining to the agent, the fact, the time, place, motive, etc.⁶² However, also the θέσις may have *peristaseis*, but these are general and do not pertain to particular persons or events.⁶³ Accordingly, a θέσις may be investigated e.g. from the angle “ubi” (ποῦ), provided this *peristasis* be not particular but general.

Referring to Hermagoras for this definition of the general or scientific issue, Cicero in the unoriginal—and because of its very unoriginality for us important—treatise written in his youth,⁶⁴ *De inv.* I 8, lists four instances of a θέσις, one of which is concerned with ethics and the other three with physics (“Are the senses true? What is the shape of the world? What is the size of the sun?”).⁶⁵ To the best of my knowledge, it has not been noticed that these three questions correspond to the titles of chapters in Aëtius.⁶⁶ We have noticed above that

⁶¹ Hermag. fr. 6a Matthes *ap. Cic., De inv.* I 8: “... Hermagoras ... divides the material of the orator in the particular question [*causam* = ὑπόθεσις] and in the general question [*quaestionem* = θέσις]. He defines the particular question as a matter involving a dispute conducted by a speech with the introduction of individual persons [...]. He defines the general question as a matter involving a dispute conducted by a speech without the introduction of individual persons, as for example: Is there any good beyond what is honourable? Are the senses true? What is the shape of the world? What is the size of the sun? [*ecquid sit bonum praeter honestum? verine sint sensus? quae sit mundi forma? quae sit solis magnitudo?* Cf. *infra*, n. 155, quotation from Victorinus’ commentary on this passage]. We believe that everyone understands perfectly that these questions are far removed from the practice of the orator. It seems absurd to assign to the orator, as if they were far from difficult, matters on which the greatest minds among the philosophers have exhausted themselves with so much effort”, etc. For the problem of the size of the sun cf. also Quintil. VII 2.6 (“*an sol maior quam terra?*”) and 4.1 (“*quantus sol?*”). Cf. also *infra*, n. 67. Hor. *Sat.* II 5.72-6 has even his rural neighbours discuss ethical θέσεις. Lists of ethical θέσεις pertaining (1) to individuals and (2) communities are to be found in the abstract from Philo of Larissa in Arius Didymus *ap. Stob.* II 41.10-13 W.

⁶² Hermag. fr. 7 M. *ap. ‘August.’ Rhet.* 141.8 ff.: (on the “*causa finita*”) “... *partes circumstantiae, id est peristaseos, septem, quas Hermagoras μόρια περιστάσεως vocat, [...]. sunt igitur haec: quis, quid, quando, ubi, cur, quem ad modum, quibus adminiculis*”, etc.

⁶³ See Throm, *op. cit.* (*supra*, n. 34), 106 ff.; Matthes “Hermagoras von Temnos”, *op. cit.* (*supra*, n. 52), 126 ff.

⁶⁴ See *De orat.* I 5.

⁶⁵ Cf. *supra*, n. 61; *infra*, text to n. 74.

⁶⁶ Aët. IV 9, εἰ ἀληθεῖς αἱ αἰσθήσεις καὶ αἱ φαντασίαι; II 2, περὶ σχήματος

Aristotle already provided similar examples for problems in ethics and physics. It is not certain that Hermagoras himself cited such instances of a general θέσις (or problem) in physics, or ethics, in his introduction. But the fact that equivalent examples are provided by later rhetoricians gives more support to the assumption that he did than that he did not.

If he did, he will have said that they are matters which for the most part are outside the province of the orator. Cicero, at any rate, suggests at *De inv.* I 8 that they are more suitable for philosophers than for orators.⁶⁷ This suggestion is not original but seems to echo a point of view largely shared by the members of the Greek rhetorical community, although the available parallels are later. Quintilian, *Inst. orat.* III 5.5, gives as one of the current definitions of θέσις the formula “*quaestiones philosopho convenientes*”. Theon, *Progymn. ap. Spengel Rhet. gr.* II 121.6-12, argues that theoretical theses are more the domain of the philosophers (μᾶλλον τοῖς φιλοσόφοις ἀρμόζουσιν) but that orators may sometimes use them too—as instances he cites εἰ ὁ ἥλιος πῦρ,⁶⁸ εἰ θεοὶ εἰσὶ⁶⁹ and εἰ θεοὶ προνοοῦνται τοῦ κόσμου.⁷⁰ One should further compare Hermogenes, *Progymn.* 25.3 ff. Rabe, who instances εἰ σφαιροειδὴς ὁ οὐρανός,⁷¹ εἰ

κόσμον; II 21, περὶ μεγέθους ἡλίου. Cf. also Cic. *De orat.* II 66, “*si enim est oratoris, quaecumque res infinite posita [= θέσις] sit, de ea posse dicere, dicendum erit ei, quanta sit solis magnitudo* [cf. Aët. II 21 again, and *De div.* II 10, quoted *infra*, n. 67], *quae forma terrae* [cf. Aët. III 10, περὶ σχήματος γῆς, and see *infra*, § VII].”

⁶⁷ The mature Cicero, *Orat.* 45, 47, says that the exceptional orator may on occasion avail himself of selected general issues. The little treatise *Paradoxa Stoicorum* is a rhetorical discussion of six general theses in the domain of ethics; in his preface (*Parad.* 6), Cicero points out: “you will sample a class of exercises that I have made a practice of employing by transposing subjects, which are dealt with in philosophical discussions in the manner of a thesis, into the rhetorical style that is my own” (“... *genus exercitationum* [i.e. *progymnasmata*] *earum quibus uti consuevi, cum ea quae dicuntur in scholis θετικῶς ad nostrum hoc oratorium transfero dicendi genus*”). In a different context, Cicero argues that questions such as, e.g., “*sol maiore terra sit an tantus quantus videatur*”, are the province of the mathematicians (just as general ethical questions are the province of the philosophers), not of the diviners (*De div.* II 10-11). J. G. F. Powell, *Cicero: Cato maior De senectute*, Cambridge Classical Texts and Commentaries 28, Cambridge: Cambridge University Press 1988, 11, who says that Hermogenes “has gone so far as to prescribe, as subjects for rhetorical debate, such purely scientific questions as the shape of the earth”, is mistaken.

⁶⁸ One of the options at Aët. II 20, περὶ οὐσίας ἡλίου.

⁶⁹ 120.15; cf. *supra*, n. 33.

⁷⁰ 121.7-8; cf. Quint. III 5.6, “*an providentia mundus regatur*”, and Aët. II 3, εἰ ἔμψυχος ὁ κόσμος καὶ προνοία διοικούμενος. Galen too believes that these theoretical questions are not entirely useless, see *infra*, text to n. 116; they are of course familiar from Cicero’s *De nat. deor.* and from Sextus, *M.* IX, where they are among the main topics to be treated.

⁷¹ An option at Aët. II 2.

πολλοὶ κόσμοι,⁷² εἰ ὁ ἥλιος πῦρ, and adds: αἶδε μὲν οὖν φιλοσόφοις ἀρμόζουσιν. In this indirect way, we are informed about the manner in which the philosophers were accustomed to discuss problems in science.⁷³

In the scholastic erotapocritic dialogue of the mature Cicero *De part. orat.*, 61-7, we again come across a quite substantial account. The general “quaestio” without times or persons is once more divided into two kinds, viz. the theoretical which aims at the acquisition of knowledge, e.g. “are the senses true or not,”⁷⁴ and the practical. The scientific question is once more divided into three classes: “sit necne, quid sit, quale sit”—existence, definition, and quality again. A further kind of theoretical question linked with that of existence is whether a certain effect is possible (64, “possitne aliquid effici?”), and again another how a particular effect is produced (*ibid.*, “quemadmodum quidque fiat”; this is a *peristasis* according to Hermagoras). To the latter class belong all the inquiries in which the causes and reasons of things are explained, e.g., in questions dealing with the things that are hidden and with problems in physics (“... omnes in quibus, ut in obscuris naturalibusque quaestionibus,”⁷⁵ *causae rationesque rerum explicantur*”⁷⁶). Cicero adds further subdivisions of the questions of the “quid” and the “quale”.

Although a plurality of doctrines concerned with the theory of στάσις existed, the prevailing view—with the powerful support of Hermagoras—was that the *staseis* relating to existence, substance, and quality are those of primary importance.⁷⁷ In this context it is interesting to observe how Cicero reports Aristotle’s procedure. According to *Orat.*, 45 f., Aristotle already taught this technique of argumentation, but did so not to make his pupils proficient in the

⁷² One of the issues at Aët. II 1; cf. also Quintil. VII 2.6, “*unus mundus an plures?*”, 4.1 “*an unus mundus?*”, and see *infra*, n. 88, n. 113.

⁷³ We should add that although Aristotle himself defines the θέσις as the paradoxical view of a celebrity or as an arguable view which goes against received opinion (*Top.* A 11.104a19 ff.), he reveals that in his day the word was used to indicate what he himself calls a dialectical problem (*Top.* A 11.104b35 f., σχεδὸν δὲ νῦν πάντα τὰ διαλεκτικὰ προβλήματα θέσεις καλοῦνται). It was the common appellation that survived, but the notion was enriched with the results of Aristotle’s methodological inquiries.

⁷⁴ Cf. *supra*, n. 61, and text to n. 65.

⁷⁵ I.e. φυσικὰ ζητήματα, cf. *supra*, n. 8.

⁷⁶ I.e. the originally Aristotelian διὰ τί.

⁷⁷ Hermag. fr. 13 M. ap. Quint. III 6.56: “*sed alii rationales tres (scil., status) putaverunt, an sit, quid sit, quale sit. Hermagoras solus quattuor [scil., status]: coniecturam, proprietatem, translationem, qualitatem*”. “*Translatio*” (μετάληψις) is added by Hermagoras to the three he takes from Aristotle, or from an Aristotelizing tradition. The names of the others are στοχασμός, ὅρος, ποιότης. Fr. 14b M. ap. ‘August.’ *Rhet.* 142.15 ff.: “... *rationales seu logicae quaestiones fiunt modis quattuor. haec enim in illis quaeruntur: an sit, quid sit, quale sit, an induci in iudicium debeat. ubi quaeritur an sit, genus id quaestionis Hermagoras στοχασμόν vocat*”, etc.

subtle art of philosophical discussion,⁷⁸ but to augment their powers as orators so that they were able to argue on either side of a question, and he also trained them in *topoi*—as he called them—for the same purpose.⁷⁹

The implied reference to the *topoi* should not go unheeded; it is important as explicit evidence for the rhetorical reception of Aristotle's theory of invention.

V. PROBLEMS AND TYPES OF QUESTIONS IN PHILOSOPHICAL THEORY AND PRACTICE

The surviving elementary philosophical handbooks—if we disregard those belonging to the *Placita* family—are few. One of the more important examples⁸⁰

⁷⁸ We may recall *De inv.* I 8 and *De orat.* II 66, where Cicero points out that the orator had better abstain from questions such as what the size of the sun is.

⁷⁹ *Orat.* 46: “*In hac [scil., quaestio a propriis personis et temporibus ad universi generis orationem traducta (quae) appellatur θέσις] Aristoteles adulescentis non ad philosophum morem tenuiter disserendi, sed ad copiam rhetoricum, in utramque partem ut ornatiue et uberius dici posset, exercuit idemque locos—sic enim appellabat—quasi argumentorum notas tradidit unde omnis in utramque partem traheretur oratio*” (my emphasis). Compare the subtler statement at Diog. Laërt. V 3, καὶ πρὸς θέσιν συνεγύμναζε [scil., Aristotle] τοὺς μαθητάς, ἅμα καὶ ῥητορικῶς ἐπασκῶν, and see further Cic. *De fin.* V 10 (part of an historical survey from an Antiochean point of view), “*ab Aristotele principe de singulis rebus in utramque partem dicendi exercitatio est instituta, ut non contra omnia semper sicut Arcesilas diceret, et tamen ut in omnibus rebus quidquid ex utraque parte dici posset exprimeret*”. See I. Düring, *Aristotle in the Ancient Biographical Tradition*, *Studia graeca et latina gothoburgensia* 5 = Göteborgs Universitets Årsskrift vol. 43.2, Göteborg 1957, 312. For “*in utramque partem disputare*” from Aristotle to Cicero see further J. Gucker, *Antiochus and the Late Academy*, *Hypomnemata* 56, Göttingen: Vandenhoeck & Ruprecht 1978, 34 n. 79.

⁸⁰ Another such handbook is the ps.-Aristotelian *Περὶ ἀρετῶν καὶ κακιῶν* (or *Περὶ ἀρετῆς*), edited by F. Susemihl in the Teubner edition of the *Eth. Eud.*, Leipzig: B. G. Teubner 1884; translation and commentary by E. A. Schmidt, *Aristoteles: Über die Tugend*, *Aristoteles Werke in deutscher Übersetzung* Bd. 18.1, Berlin: Akademie-Verlag - Darmstadt: Wissenschaftliche Buchgesellschaft 1965, ³1986. It has survived not only in mss, but also *ap.* Stob. *Flor.* III 137.6-148.12 Hense. Scholars now date this tract to the Early Peripatos. It also exists in a revised version with Stoic additions (among which the whole first part of the treatise): ps.-Andronicus *Περὶ παθῶν*, edited with a substantial commentary by A. Glibert-Thirry, *Pseudo-Andronicus de Rhodes <<ΠΕΡΙ ΠΑΘΩΝ>>*, *Corpus latinum commentariorum in Aristotelem graecorum*, Suppl. 2, Leiden: E. J. Brill 1977. Twenty-one manuscripts are known, of which only one—*Coislin* 120 (= C), from the tenth cent.—contains the whole work, the others preserving either its first or its second part only. Grosseteste (whose version is to be dated before 1240, see Glibert-Thirry, *op. cit.* 142) translates part 1 as “*Andronici Peripatetici de passionibus*” and part 2 as “*Aristotelis de virtute*”. Glibert-Thirry prints the Greek text next to Grosseteste's and as a rule brackets the sections, found in part of the manuscript tradition, which have no counterpart in the Latin and are not attested in the earliest Greek manuscripts (viz., C and F, the latter from the 13th cent.). One should however take into account that longer and shorter versions of this work may have existed, as is, e.g., the case for the *Div. aristot.*

is the so-called *Divisiones aristoteleae* which survives in three manuscripts,⁸¹ viz. *Marc. gr.* 257, *Paris. graec.* 39,⁸² and *Leid. Voss. gr.* Q 11,⁸³ and *ap.* Diog. Laërt. III 80-109.

Division nr. 42 (in Mutschmann's numeration; not transcribed in Diog. Laërt.) has the title τὰ ἐν φιλοσοφίᾳ προβλήματα in *L*.⁸⁴ The division is into five

(for which see below). Grosseteste may have translated such a shorter version, for he also omits passages reliably attested for part 1 in the Greek tradition. If the parts of the text bracketed by Glibert-Thierry—e.g., the section Κατὰ Χρύσιππον (259.74-261.97 Gl.-Th. = *SVF* III 268-9; by no means purely Stoic), not attested in *C* and *F* and not translated by Grosseteste—were added after the 12th or 13th cent. CE, one must assume that the tract was still used at the time and not merely copied. I note in passing that in both parts the method of diaeresis is applied throughout and speak of this work at some length because the various forms in which it survives show in what ways handbooks were used and modified. What is valid for this work is also valid for the *Plac.* and the *Div. arist.* It makes little sense to look for an *Urquelle*.

⁸¹ The small number of mss shows that in later times this tract was less popular than ps.-Aristotle and ps.-Andronicus (see previous n.), but the inclusion of a version in Diog. Laërt.—which *mutatis mutandis* may be compared to the inclusion of ps.-Arist. *De virt.* in Stobaeus—and the reference in the *Schol. in Basil.* (see *infra*, n. 83) prove that much earlier it was a current text.

⁸² *P* seems to be an abstract from an ancestor of *M*, cf. P. Boudreaux, "Un nouveau manuscrit des *Divisiones Aristoteleae*", *Rev. de Philol.* 33 (1909), 221 ff.

⁸³ References and tidbits of text at Ross, *op. cit.* (*supra*, n. 34), 101-2, ΔΙΑΙΠΕΣΕΙΣ fr. 2 (= 114 R³) and 3 (= 115 R³). Edition of the text of Diog. Laërt. and *M* by H. Mutschmann, *Divisiones quae vulgo dicuntur aristoteleae*, Leipzig: B. G. Teubner 1906, who prints the divisions that are common to Diog. Laërt. and *M* in parallel columns. *L* was discovered by P. Moraux, who publishes its readings (together with those of *P*) in those cases where *L* and/or *P* differ from Mutschmann's text, "Témoins inconnus des *Divisiones Aristoteleae*", *Ant. Class.* 46 (1977), 100 ff. The *Div. arist.* are printed as fr. 82 (Diog. Laërt.) and 83 (*M*)—substantially in the same form as by Rose but with some notice being taken of Mutschmann's apparatus—in O. Gigon, *Aristotelis Opera, Volumen tertium: Librorum deperditorum fragmenta*, Berlin - New York: W. de Gruyter 1987, who fails to adduce *L* and oddly believes that what we have here is a series of excerpts from Aristotelian dialogues assembled for a protreptic (*sic*) purpose (C. Rossitto, in her part of a collective review of Gigon, *Elenchos* 10 [1989], 214, accepts the attribution to Aristotle but rejects the protreptic purpose). Useful commentary by C. Rossitto, *Aristotele ed Altri: Divisioni*, Studi aristotelici 2, Padova: Antenore 1984, who takes the various existing versions into account but only provides translations of Diog. Laërt. (viz. that by M. Gigante) and *M*. A neglected reference to nr. 5 Mutschm. is to be found at *Scholia in Basilii Hexaemeron* 200.4-5 (G. Pasquali, *Doxographisches aus Basilios-scholiën*, Nachr.Kön.Ges.Göttingen Phil.-hist. Kl. 1910, 194 ff.): ἐν ταῖς Ἀριστοτέλους εἰς Πλάτωνα ἀναφερομέναις Διαίρεσιν κεῖται αὕτη τῶν τεχνῶν ἡ διαφορά.

⁸⁴ Ms. Rossitto advises me that there are no titles in *P* and *M* (except for nr. 2 in *M*) and that those to be found in the Teubner edition of *M* have been added by Mutschmann. Cf. also nr. 37 *M*.—not in Diog. Laërt. either—, διαίρεσις τῶν μεθόδων τῶν εἰς τὰ προβλήματα (*L*), which however is not immediately relevant to nr. 42.

species: πολιτικόν, διαλεκτικόν, φυσικόν, ἠθικόν, ῥητορικόν.⁸⁵ It clearly is a descendant of Aristotle's division of propositions and problems at *Top.* A 14 into ethical, physical, and logical classes;⁸⁶ the finer subdivisions are not relevant in our present context. We should note that what the *Div. arist.* calls the "dialectical" problem corresponds to what Aristotle calls the "logical" proposition, or problem; the instance provided, 55.11-2 M., is the same as Aristotle's, viz., whether the knowledge of contraries is the same. The example of the ethical problem is different from Aristotle's; it runs *πότερον δεῖ πάντα χαρίζεσθαι τοῖς φίλοις ἢ τὰ μὲν τὰ δὲ οὐ*. This is strikingly similar to the example of a general "*quaestio*" pertaining to action provided by Cic. *De part. orat.* 62,⁸⁷ "*ut si quaeritur quibus officiis amicitia colenda sit*". For the physical problem, *Div. arist.* does not cite Aristotle's instance, but gives *πότερον δὲ εἷς κόσμος ἐστὶν ἢ πλείονα, καὶ τὰλλα τὰ τοιαῦτα* (56.1-2 M.).⁸⁸ It is noteworthy that here (and here only) the *Div. arist.* notes that more problems of this nature are available.

The information provided by this passage in the *Div. arist.* is confirmed in the proem of ps.-Plutarch/Aëtius (no parallel in either Stobaeus or Theodoret). Ps.-Plutarch first says that because he is handing on τὸν ... φυσικὸν λόγον, he wishes to begin by providing the division of philosophy into its parts, so that we may learn what part, and how great a part, of philosophy physics is. He next (= *SVF* II 35) gives the standard definition of wisdom and philosophy according to the Stoics, and then their tripartite division into physics, ethics, and logic, adding that physics is concerned with the investigation of *problems* about the universe and what is in the universe (φυσικὸν ... ὅταν περὶ κόσμου ζητῶμεν καὶ περὶ τῶν ἐν κόσμῳ). Finally (*DG* 273a25-274a12), he gives the division according to "Aristotle and Theophrastus and almost all the Peripatetics", who say that

it is necessary that the perfect man be both a theoretician of the things that are and someone concerned with action as regards the things that have to be

⁸⁵ Mutschmann *ad loc.* aptly adduces Arist. *Top.* A 14 (for which see *supra*, § III), and Diog. Laërt. V 28-9 for the later Peripatetic subdivision of the parts of philosophy.

⁸⁶ Cf. also Rossitto, *op. cit.* (*supra*, n. 83), 266 ff.

⁸⁷ Cf. *supra*, p. 81; for the parallel at Gal. *PHP* IX 7 see *infra*, p. 91. It is clear that *Div. arist.* nr. 42 provides a listing of what in rhetorical terminology are called "*quaestiones infinitae*", or *θέσεις*.

⁸⁸ Whether there is one cosmos or more than one is one of the issues at Aët. II 1, περὶ κόσμου, esp. 1.2-3 (where the opposition is one v. infinitely many), and it is given as an example by Hermogenes, see *supra*, text to n. 72. It is an issue also raised by Aristotle himself, *Cael.* A 7-8. It is already stated, in a baffling way, at Plat. *Tim.* 55c-d (infinitely many v. finitely many, five v. one; see also *infra*, n. 155 *ad finem*). I suppose that it was already discussed before Plato (see *supra*, text to n. 17), although there is no evidence. For Galen see *infra*, n. 113 and text thereto.

[θεωρητικὸν ... τῶν ὄντων καὶ πρακτικὸν τῶν δεόντων].

It is possible to learn this also from the following (examples): e.g., the problem is [ζητεῖται], whether the sun is an animal [ζῷον] or not, because it is visible [⁸⁹]. He who investigates this problem is a theoretician because only what is, is the object of (this) theoretical inquiry. In the same way, the problem may be whether the cosmos is infinite and whether there is anything outside the cosmos [εἰ ἄπειρος ὁ κόσμος ἐστὶ καὶ εἰ ἔξω τι τοῦ κόσμου ἐστίν]. For all these (issues) are theoretical.

Again, the problem may be how one ought to direct one's life and how to guide one's children and how to govern and how to legislate. For all these problems are investigated for the sake of action, and such a person is one who is concerned with action.

It is clear that this section ultimately depends on the passages in book I of Aristotle's *Topics* that have been discussed above (§ III). We again have the distinction between theoretical and practical issues, with examples added (note that ps.-Plutarch omits to speak of the logical part of philosophy according to the Peripatetics, though he does so in connexion with the Stoics). It is also clear that Aristotle's doctrine has been brought up to date, for the examples in the domain of ethics are what the rhetoricians would call theoretical θέσεις and the examples in the domain of physics are different from Aristotle's, the third pertaining to a question that only became prominent in the Hellenistic period.

Actually, both as to its structure and as to its contents, ps.-Plutarch's presentation of the main distinction including examples much resembles those of Cicero and other rhetoricians studied in the previous paragraph, with a major difference in emphasis. The rhetoricians begin with the physical θέσεις, which, however, are quickly brushed aside in order to make way for the treatment of ethical (θέσεις and especially) ὑποθέσεις. Ps.-Plutarch too begins with the physikal θέσεις, or ζητήματα, but in his case these are the real concern; the ethical θέσεις are merely added *par acquit de conscience*.

⁸⁹ εἴπερ † ὁρᾶται † mss. The Arabic translation runs "ob die Sonne grösser ist, als er sie sieht"; this corresponds to one of the options at Aët. II 21 but may be pure fantasy. The editors of the Greek text have variously emended the word ὁρᾶται; Mau brackets both words. Perhaps ὁρᾶται is merely a *Verschlimmbesserung* which was interpolated after πῦρ had been corrupted to περ. For εἰ (ὁ ἥλιος) πῦρ see *supra*, text to n. 68. Whether the sun is an animal or not is an issue connected with Aët. II 20; most of the tenets cited make it a purely material entity, but according to II 20.4 the Stoics (ps.-Plutarch) and Cleanthes (Stobaeus) say it is an ἀναμμινα νοερόν, and what is intelligent is of course alive. I need not remind the reader of the belief—widespread in antiquity and especially in later antiquity—that the heavenly bodies are gods. Alternatively, one may assume that there is only one problem, not two, viz., "whether the sun, if fire, is an animal or not".

Ps.-Plutarch's first example of a problem in physics, which is concerned with an attribute of the sun (note the "whether ... or not" form), cannot be paralleled from the surviving *Plac.* because the text is corrupt. The two others can be paralleled. The question whether the cosmos is infinite is one of the issues of Aët. II 1, and the question whether there is anything outside the cosmos is treated at Aët. I 18 and II 9. In actual fact, these questions in one form or another are cited as examples of physical problems by various other authors, as we shall see in the pages that follow. What is said about physics *qua* part of philosophy concerned with specific sets of *problems* is entirely appropriate as a characterisation of the nature of the *Plac.* as a whole. Because ps.-Plutarch is an epitomator we may assume that he gives us the gist of the proem of Aëtius; in what follows, I shall therefore refer to this passage as Aët. proem 1.3. Presumably, we may hypothesize that his reference to "Aristotle and Theophrastus and all the Peripatetics" as upholding a bipartition of philosophy is intended to include the examples of problems in physics and ethics which follow. In the passages from the *Topics* studied in § III the tripartition of problems and propositions is at any rate illustrated by examples that are quite similar to those given by ps.-Plutarch.

One should add that, according to Arius Didymus *ap. Stob.* II 42.7-10 W., Eudorus of Alexandria (called an Academic by Arius) in his valuable study provided a diaeresis of philosophical theory—viz., as to each of its three main parts—in which he proceeded by means of *problems* (πάσαν ἐπεξελήλυθε προβληματικῶς τὴν ἐπιστήμην); he summarizes Eudorus' diaeresis pertaining to ethics. Arius Didymus himself began his exposition of the various ethical doctrines with the *problems* (*ibid.* 45.8, ἀρκτέον δὲ τῶν προβλημάτων). Stobaeus has preserved Arius' exposition of the problem(s) περὶ τέλους (*ibid.* 45.11 ff.), in which he provides a generous overview of the contrasting views according to his own maxim that προσεπινοητέον καὶ τὰ τῶν ἄλλων ἐπισκοπεῖν, καθάπερ οὐ πάντων, οὕτως τῶν περὶ ταῦτα διενεγκάντων (*ibid.* 42.4-5). Less generous excerpts dealing with the problems, or θέσεις, pertaining to the questions περὶ ἀγαθῶν καὶ κακῶν and εἰ πᾶν τὸ καλὸν δι' αὐτὸ αἰρετόν have been preserved *ibid.*, 53.21 ff. and 56.24 ff. Consequently, the systematic approach by means of problems and the discussion of the contrasting views that are relevant is not a prerogative of the literature dealing with physical *placita* which constitutes the main focus of the present inquiry, but was also employed, in relation with issues in ethics, by at least one author who wrote a book belonging to the genre Περὶ αἰρέσεων, viz., Arius Didymus.

It may be instructive to provide a few examples of the way the discussion of a πρόβλημα φυσικόν, in literature that may be called philosophical, is structured according to the types of inquiry pertaining to the substance and the accidents, or attributes, as first stipulated by Aristotle. Cic., *Ac. pr.* II 124, applies the questions concerned with the what it is, with place, existence, quantity, and

quality to the soul:⁹⁰

Do we grasp what the mind is [*quid sit*], where it is [*ubi sit*] and last but not least whether it exists or, as is the tenet of Dicaearchus, does not exist at all [*sitne an ... ne sit quidem ullus*]? If it does exist, does it have three parts, as is the tenet of Plato, (viz.) reason, anger, desire, or is it undivided and one? If it is undivided, (do we grasp whether) is it fire, or air, or blood, or, as (is the tenet of) Xenocrates, a number without body—something of which one can hardly understand how it is? And whatever it is, (do we grasp) whether it is mortal or eternal?⁹¹

A good Greek parallel—proving at the same time that Cicero does not apply a rhetorical technique to a philosophical issue but that the method was common to both disciplines—is at Philo, *Somn.* I 30-3:⁹²

What about the fourth ingredient in ourselves, the regent intellect: is it capable of being apprehended? Not at all. What do we suppose it to be as to its substance [τί γὰρ αὐτὸν οἰόμεθα κατὰ τὴν οὐσίαν εἶναι]? Pneuma, or blood, or body in general—no, not a body, we should say it is incorporeal—, or limit, or form, or number, or perpetual motion, or harmony, or what among all that exists? ... Furthermore: when we die, is it put out and does it perish together with our bodies, or does it live on for a considerable time, or is it wholly indestructible? Where [ποῦ] in man has the intellect found its hidden abode? Does it really have a home? Some have dedicated the head, the citadel in us, to it, where the senses have their station too, because they thought it plausible that these should be posted like bodyguards around a Great King. Others, convinced that it is carried in the heart as a divine image, obstinately fight for this (other) view. So in every case it is the fourth that is inapprehensible ...⁹³

In Cicero as well as in Philo, we may notice that the method of diaeresis is applied not only to the substance but also to the accidents.⁹⁴

The technique based on a check-list of questions is also used by Cicero elsewhere, e.g., when, at *De nat. deor.* I 2, he first opposes the view of the majority, viz., that the gods exist (“*deos esse*”), to that of those who deny or

⁹⁰ A passage entirely parallel to *Tusc.* I 18 ff. which derives from the *Vet. plac.* according to Diels *DG* 202 f. But he did not attribute *Ac. pr.* II 124 to the *Vet. plac.* but *DG* 211 derived it from Clitomachus.

⁹¹ Tr. Rackham, modified.

⁹² P. Wendland, *Eine doxographische Quelle Philo's*, SBBerlin 1897, 1076 ff., was the first to link this passage with the *Vet. plac.*

⁹³ Tr. Whittaker-Colson, modified.

⁹⁴ For further details and other parallels see my paper cited *supra*, n. 11, 3117 ff., 3122 ff., and *passim*; the parallel at Aët. IV 2-7 is cited *infra*, text to n. 121.

doubt their existence.⁹⁵ This is the question of the type “*sitne*”. Those who say they do exist vehemently disagree among themselves “*de figuris deorum et de locis atque sedibus et de actione vitae*” and as to whether or not they exercise providence; these are the questions “*quid*” and “*quale*”, and even the question “*ubi*”, as distinguished in the *Orat.* and the *Top.* See also *De nat. deor.* I 65: “*concedo esse deos. doce me igitur unde⁹⁶ sint, ubi sint, quales sint corpore, animo, vita.*” The pattern provided by these questions determines the treatment of the issues in the *De nat. deor.* as a whole.

Further information is to be found in Galen, who for instance explicitly speaks of the *diaeresis of the problem*. At *PHP* IV 1.14-17, he criticizes Chrysippus’ treatment of the theory of the affections in the latter’s *Περὶ παθῶν* because Chrysippus did not take Plato’s *doxa* concerned with the soul into account: “... when he asks whether the affections supervene on judgements, he clearly departs from Plato’s view [δόξης]. Indeed in his division of the problem [ἐν τῇ διαιρέσει τοῦ προβλήματος] he did not even consider it (scil., this view) worth mentioning. And yet this is the first thing that one might bring against him, that he was misled by the incompleteness of his division [τὸ τῆς διαρρέσεως ἐλλειπές].”⁹⁷ He should have taken Plato’s tenet⁹⁸ that the soul has three parts into account because in this way the “problem admits of being cut into three [εἰς τρία τέμνεσθαι τὸ πρόβλημα].”⁹⁹ One should note that the division of the problem is said to be incomplete for two reasons. First, it does not list the δόξα of Plato; what Chrysippus apparently should have done in the *On the Affections* is refer to this tenet in the same way as at the beginning of his discussion of the seat of the regent part in book I of the *On the Soul* (the fragment is quoted by Galen at *PHP* III 1.10-15¹⁰⁰). Accordingly, Chrysippus has omitted to acknowledge a problem that has to be solved—or at least to be referred to—before one may speak of the relation between affections and judgements, viz.: Is the soul one or not, i.e. does it have different parts?; and in this context the relevant *doxai* should have been listed. Secondly, the division of the problem Chrysippus actually does discuss is incomplete precisely because he has failed to acknowledge

⁹⁵ Cf. Arist. *APo.* B 1 (quoted *supra*, text to n. 33), Theon, *loc. cit.* (text to n. 69), Aët. I 7, Sextus *M.* IX 49 ff., and *infra*, text to n. 117.

⁹⁶ Here meaning “what they consist of”.

⁹⁷ 238.11-5 De Lacy, whose translation I have slightly modified.

⁹⁸ Cf. Aët. IV 1.1.

⁹⁹ At *PHP* IX 5.11 ff. Galen speaks at length of the method of *diaeresis*, discussing its use by Plato and citing passages from the dialogues; at IX 6.1 ff., he finds precedent for the application of the method in Hippocrates, citing a number of passages from the *Corp. Hipp.* See further I. von Müller, *Über Galens Werk vom wissenschaftlichen Beweis*, Abh.Bay.Ak. 20, München: Verlag der k. Akademie 1897, 445 ff., and R. B. Edlow, *Galen on Language and Ambiguity*, *Philosophia antiqua* 31, Leiden: E. J. Brill 1977, 49 ff.

¹⁰⁰ See further my paper quoted *supra*, n. 22.

the possibility that the soul may have three parts, as an important authority believed. In other words, Chrysippus' mistake according to Galen is a rather elementary one, that is to say one for which an ancient freshman in philosophy would probably have been rebuked. Galen's objection is in fact a bit silly, for in defence of Chrysippus one may of course reply that the question of the soul's unity had been settled to his own satisfaction in the *On the Soul*; but this is by the way.

In the eighth book of the *PHP*, Galen speaks of theoretical problems in philosophy which for the most part are useless for ethics and politics (and of course medicine).¹⁰¹ This distinction between theoretical and practical questions goes back to Aristotle,¹⁰² whose logical works Galen had thoroughly studied. But his attitude in rejecting speculative questions (with some partial exceptions) in the field of physics is quite similar to the attitude of the rhetoricians concerning the general issues for which as a rule they see no practical application. We have noticed that in rhetorical theory too the distinction between knowledge for its own sake and knowledge that can be applied in actual practice was employed in a consistent way.¹⁰³ The examples of such problems listed by Galen can without exception be paralleled from the *Placita* literature, and some among them can even be paralleled from the rhetoricians. Galen insists that they are irrelevant because they cannot be decided by experience, which is why the disagreements (διαφωνίαι) among the philosophers according to him never end. Galen, in other words, was fully aware of the fact that the overviews of tenets concerned with a specific issue in the *Placita* had been compiled in order to expose the disagreements that exist or at the very least could be used for this purpose. We may first quote *PHP* IX 6.21-22, 576.28-78.2:¹⁰⁴

In philosophy it is not surprising that most *diaphoniae* have not been resolved, as the matters it deals with cannot be clearly judged by an empirical test. Because of this (perplexity)

(I)¹⁰⁵ some say (a) that the cosmos has not been generated, others (b) that it has been generated,

¹⁰¹ For Galen on unprofitable issues see also M. Vegetti, "Tradizione e verità: Forme della storiografia filosofico-scientifica nel *De placitis* di Galeno", in Cambiano (*supra*, n. 17), 234 ff.

¹⁰² See *supra*, § III.

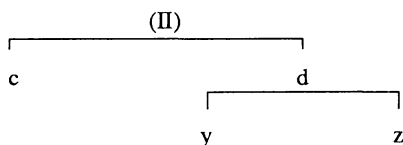
¹⁰³ See *supra*, § IV.

¹⁰⁴ The translations of this passage and the next are again De Lacy's, with some modifications.

¹⁰⁵ This division is as old as Gorgias, see my paper quoted *supra* (n. 17), 37 f.; the issue corresponds to Aët. II 7. Parallels in Galen other than the one quoted *infra*, text to n. 114: Gal., *De animi cuiuslibet peccat.* ch. 3 ap. I. Marquardt (ed.), *Cl. Galeni scripta minora* vol. I, Leipzig: B. G. Teubner 1884, repr. Amsterdam: Adolf M. Hakkert 1967, 52.13-4, and ap. W. de Boer (ed.), *Corpus medicorum graecorum* V 4, 1. 1, Leipzig

(II)¹⁰⁶ just as again some say (c) that there is nothing outside which surrounds (the cosmos), and others (d) that there is,
 and of the latter (d)
 some say (y)¹⁰⁷ that what surrounds it is a void which has no substance in it, others¹⁰⁸ (z) that it is surrounded by other cosmoi numerous beyond calculation, so that their number reaches to infinity.¹⁰⁹

The instances of *diaphoniae* in speculative cosmology which are provided are given in the form of divisions, as is especially clear for that concerned with what is beyond the cosmos:¹¹⁰



One should here observe (1) that the disagreements pertain to the accidents, or attributes, of the cosmos in the categories of time, place, and number, and (2) that the question εἰ ἔστι is at issue in (II) c—d. We also note in passing that the Stoic notion of the incorporeal allows them to speak of something outside the cosmos while denying that it has οὐσία in it.¹¹¹

- Berlin: B. G. Teubner 1937, 46.23-4; R. Walzer, *Galen On Medical Experience*, London etc.: Oxford University Press 1944, repr. 1947, xix 3-4. Cf. also Lucian, *Icaromenippus* 8.

¹⁰⁶ Cf. Aët. I 18, περὶ κενοῦ, and II 9, περὶ τοῦ ἐκτὸς τοῦ κόσμου εἰ ἔστι κενόν. Cited as an example of a problem in physics, Aët. proem 1.3.

¹⁰⁷ Cf. Aët. I 18.5, II 9.2.

¹⁰⁸ Cf. Aët. I 18.3 combined with Aët. II 1.3; same combination, in a most significant way, at Aët. proem 1.3 (ps.-Plutarch only; see *supra*, p. 84 f.), at Achilles, *Isag.* ch. 8, and at Gal., *De animi cuiuslibet peccat.* ch. 7 (partly printed as SVF II 542; cf. *infra*, n. 111)—where he discusses this problem at length and opposes the views of the Peripatetics, the Stoics and the Epicureans to one another—80.3-12 Marquardt = 67.6-20 de Boer.

¹⁰⁹ Cf. Aët. I 5 and II 1, where infinitely many is one of the alternatives.

¹¹⁰ This diaeresis is paralleled at Achilles *Isag.* ch. 8, εἰ ἔστι τι ἐκτὸς κενόν, but in a different sequence: first y + z, i.e.—when taken together—d, then c. Maass *ad loc.* and Diels *ad Aët.* I 18 have failed to notice the parallel for Achilles in the *Plac.* Note that y in Achilles is not cited according to the standard Stoic formula as *ap.* Galen but in that of Posidonius as *ap.* Aët. II 9.3 = Posid. fr. 97 Edelstein-Kidd, cf. I. G. Kidd, *Posidonius*, Vol. II: *The Commentary* (i), Cambridge Classical Texts and Commentaries 14A, Cambridge: Cambridge University Press 1988, 392.

¹¹¹ This is the only text I know which explicitly attributes to the Stoics the view that the void does not contain οὐσία; that the Stoics are meant is of course clear in itself, from the parallel at Aët. I 18.5, and from what Galen says at *De animi cuiuslibet*

The second passage—in which the examples of the first are repeated more briefly and others are added—is at *PHP* IX 7.9-13, 588.7-24:

To inquire into those matters which are not useful for ethics and political activities is appropriate only for those philosophers who have chosen theoretical philosophy; thus they raise the question

whether there is something beyond this universe, and if there is, what sort of thing [ὅποῖόν τι] this is,¹¹²

and whether this cosmos is restricted to itself and whether there are more than one and whether these are very large in number,¹¹³

and similarly whether this cosmos of ours has been generated or has not been generated,¹¹⁴

just as, assuming it has been generated, they ask whether some god was its demiurge or no god at all, but some sort of irrational and artless cause¹¹⁵

But problems [ζητήματα] such as these contribute nothing to managing one's own household well or caring for the public interest or acting with friendliness and kindness towards kinsmen, citizens, and foreigners. ... The truth is that while it is useless to pose the question whether the universe has been generated or not, this is not the case with that concerning providence and the gods.¹¹⁶ It is better for all of us to deal with the question that there is something in the cosmos superior to men in power and wisdom, but it is not necessary to consider (the question) what sort of substance [οὐσίαν] the gods have, whether they are wholly incorporeal or have bodies just as we do.¹¹⁷

We may again note the presence of the different types of issues. The question of existence, in relation to the gods, is important according to Galen, but that concerned with their substance is not.¹¹⁸

peccat. 7, 80.4-5 Marquardt = 67.14-5 de Boer (I follow the latter's text): ὁ μὲν γὰρ Στωικὸς οὐκ ἔνδον εἶναι τι κενόν (λέγων), ἔξωθεν δὲ τοῦ κόσμου ὑπάρχειν αὐτό (cf. *supra*, n. 108).

¹¹² Cf. (II) in the first passage.

¹¹³ Cf. *supra*, n. 88 and text thereto, and text to n. 72; note that Galen not only has the division one v. infinitely many (as in Aëtius), but adds 'many' (which is in Hermogenes who however omits 'infinitely many'). Cf. also Lucian, *loc. cit.* (*supra*, n. 105), and the second example of a problem in physics at Aët. proem 1.3.

¹¹⁴ Cf. (I) in the first passage and the parallel text at *On Medical Exper.* cited *supra*, n. 105.

¹¹⁵ Cf. Aët. II 3, I 7.8 f.; Lucian, *loc. cit.* (*supra*, n. 105).

¹¹⁶ We have seen above, text to n. 69 and n. 70, that Theon makes the same exception.

¹¹⁷ For these two questions at Arist. *APo.* B 1 see *supra*, text to n. 33. At Aët. I 7 most of the *doxai* make the god corporeal; for the view of Epicurus that they are anthropomorphic see I 7.34.

¹¹⁸ In the same way, Galen often says that we may assume and indeed are aware that the soul exists, but that its οὐσία and the question whether or not it is immortal

A number of other passages from Galen demonstrating his use of *Placita* material could be quoted and analyzed as well,¹¹⁹ but for our present purpose these two will do.

VI. PROBLEMS AND QUESTION-TYPES IN AËTIUS

In the footnotes to the preceding sections I have indicated parallels in Aëtius for instances of the (φυσικὴ) θέσις cited by Cicero and other rhetoricians, as well as for problems cited by Galen, and also indicated parallels in Aëtius for examples in Aristotle of a φυσικὴ πρότασις (or πρόβλημα φυσικόν). It will, I trust, have become clear that much is to be gained from comparing passages in Aristotle and others with chapters, or parts of chapters, in the *Placita* of Aëtius. But there is more. The question-types first formulated by Aristotle, involving the application of the theory of the categories, seem to be behind the lay-out of large sections of the surviving ps.-Plutarch and the—as yet not irreproachably—reconstructed Aëtius. I shall endeavour to show this by citing a few selected instances.

1. *Existence*: Aët. I 7 (τίς ἐστὶν ὁ θεός), which according to its title is concerned with the various views concerning the definition of the god, begins by listing the views of the atheists and then continues with the various views about the nature of the gods (we have noticed above that Aristotle, at *APo.* B1.89b32-4, successively instances both εἰ ἔστι ... θεός and τί ... ἐστὶ θεός). Aët. I 24 (περὶ γενέσεως καὶ φθορᾶς) begins by listing the view of those who deny that coming to be and passing away exist.

2. *Definition/substance*: Aët. I 1, τί ἐστὶ φύσις; II 13, τίς ἡ οὐσία τῶν ἄστρον κτλ.; II 20, περὶ οὐσίας ἡλίου (cf. Arist. *Phys.* B 2.193b27 ff.); II 25, περὶ οὐσίας σελήνης (cf. Arist. *Phys.* B 2.193b27 ff.); IV 3, εἰ ὥμα ἡ ψυχὴ καὶ τίς ἡ οὐσία αὐτῆς.

3. *Quality*: Aët. II 2, περὶ σχήματος κόσμου (cf. Arist. *Phys.* B 2.193b27 ff.); II 22, περὶ σχήματος ἡλίου (cf. Arist. *Phys.* B 2.193b27 ff.); II 27, περὶ σχήματος σελήνης (cf. Arist. *Phys.* B 2.193b27 ff.); III 11, περὶ σχήματος γῆς (cf. Arist. *Phys.* B 2.193b27 ff., and see below, § VII). Attributes in general: II 24, περὶ ἐκλείψεως ἡλίου (cf. Aristotle's example of the question ὅτι¹²⁰); II 29, περὶ ἐκλείψεως σελήνης.

4. *Cause*: Aët. II 8, τίς ἡ αἰτία τοῦ τὸν κόσμον ἐγκλιθῆναι; III 17,

are beyond our grasp, see the passages cited by P. Moraux, "Galien et Aristote", in *Images of Man in Ancient and Medieval Thought*, Festschr. G. Verbeke, Leuven: University Press 1976, 136 f. n. 34; cf. also H. Diller, "Empirie und Logos: Galens Stellung zu Platon und Hippokrates", in K. Döring - W. Kullman (eds.), *Studia platonica*, Festschr. H. Gundert, Amsterdam: B. R. Grüner 1974, 235 ff.

¹¹⁹ For *De loc. aff.* III.5 see my paper cited *supra*, n. 11, 3141 ff.

¹²⁰ See *supra*, text to n. 30. For *Phys.* B 2 193b25 ff. see *infra*, n. 122.

πῶς ἀμπώτιδες γίνονται καὶ πλήμυραι; V 9, διὰ τί πολλάκις γυνὴ συνουσιάζουσα οὐ συλλάμβανει;

5. *Place*: Aët. II 4.15 ff. (Stobaeus only), ποῦ ἔχει τὸ ἡγεμονικὸν ὁ κόσμος; III 11, περὶ θέσεως γῆς; IV 5, τί τὸ τῆς ψυχῆς ἡγεμονικὸν καὶ ἐν τίνι ἐστίν;

6. *Quantity*: Aët. II 21, περὶ μεγέθους ἡλίου; II 26, περὶ μεγέθους σελήνης; IV 3, περὶ μερῶν τῆς ψυχῆς; IV 10, πόσαι εἰσὶν αἱ αἰσθήσεις.

7. We also find sequences according to the questions c.q. categories. As a first example, we may cite the series of six chapters dealing with the problems pertaining to the soul,¹²¹ Aët. IV 2-7. Chs. IV 2-3 are concerned with what the soul is, IV 4 with the number of its parts (category of quantity), IV 5 with the substance and the location (category of place) of the regent part, IV 6 with the motion of the soul (categories of quantity and place), and IV 7 with its immortality (category of time).

Similar series are found which deal with the heavenly bodies. The problems concerned with the sun are dealt with in five chapters: Aët. II 20, περὶ οὐσίας ἡλίου; II 21, περὶ μεγέθους ἡλίου; II 22, περὶ σχήματος ἡλίου; then a chapter dealing with a question pertaining to the sun only: II 23, περὶ τροπῶν ἡλίου; and finally II 24, περὶ ἐκλείψεως ἡλίου (these last two chapters are specific applications of the general topic περὶ κινήσεως in the sense of the categories doing and being affected). A similar series of six chapters deals with the same set of problems relative to the moon, Aët. II 25-7 and 29: substance, size, shape, eclipse. But instead of the item περὶ τροπῶν we find two questions that are relevant in relation to the moon only, viz. II 28, περὶ φωτισμῶν (a specific application of the general topic περὶ κινήσεως again), and II 30, περὶ ἐμφάσεως αὐτῆς, διὰ τί [cause] γεώδης φαίνεται.

A comparable series of seven chapters in book III deals with the problems relating to the earth. The following questions are listed: substance/quantity, III 9 περὶ γῆς εἰ μία καὶ πεπερασμένη καὶ ποίου μεγέθους; quality, III 10, περὶ σχήματος γῆς; place, III 11, περὶ θέσεως γῆς, and III 12, περὶ ἐγκλίσεως γῆς; movement, III 13, περὶ κινήσεως γῆς; division into parts, i.e., quantity again, III 14 περὶ διαιρέσεως γῆς; and finally a chapter dealing with a specific problem relevant only for the earth, III 15, περὶ σεισμῶν γῆς.

It is to be noted that the majority of chapter-titles in Aëtius has been simplified to the seemingly descriptive and innocuous “περὶ x” type (e.g. I 9, περὶ ὕλης); but study of their contents shows that they are concerned with problematic issues. However, the wording of a sizeable number of chapter-titles still reveals that what we have here are problems of a specific formal type, for quite a few begin with the word εἰ, or with τί or τίς, or with διὰ τί, or with words such as πόσαι or πόσα, or πῶς, or πόθεν, or have such terms somewhere else in their title.

¹²¹ For parallels in Cicero and Philo see *supra*, § V.

VII. ARISTOTLE AND THE *PLACITA* ON THE EARTH

In the first two books of the *Cael.*, Aristotle discusses a number of questions pertaining to the cosmos and the heavenly bodies.¹²² He deals with the element of the heavenly bodies, their shape, and their movement in general but does not, unlike Aëtius in book II of the *Placita*, devote special sections to the stars, the sun, and the moon. At *Cael.* II 13, however, we find an extensive and detailed discussion concerned with the earth, in the course of which the views of others are scrutinized at length.¹²³ The parallels with Aët. III 9-15¹²⁴ are noteworthy.

¹²² Comparing these with the parallels in Aëtius must be left to another occasion. The fact that questions concerned with the fixed stars, the planets, the sun, and the moon are not treated in *Cael.* in the same manner as the questions concerned with the earth is noteworthy. But elsewhere Aristotle reveals that he is aware that this may be done, and that the materials were available. See *Phys.* B 2.193b26 ff.: "it seems absurd that the philosopher of nature should know what the sun or moon is [τί ἐστιν] but should not know any of their attributes [τῶν συμβεβηκότων—for this distinction between substance and attributes see *supra*, § III], particularly because those who (write) about nature obviously speak of the shape [σχήματος] of the sun [cf. Aët. II 22] as well as of the moon [cf. Aët. II 27], and devote special attention (to the question) whether the earth [cf. Aët. III 10, and see further below] and the cosmos [cf. Aët. II 2] are spherical or not".

¹²³ H. Cherniss, *Aristotle's Criticism of Presocratic Philosophy*, Baltimore: Johns Hopkins Press 1935, repr. New York: Octagon Books 1976, 197 ff., and *Aristotle's Criticism of Plato and the Academy*, Baltimore: The John Hopkins Press 1944, repr. New York: Russell & Russell Inc. 1962, 545 ff., does not deal with the aspects I attempt to analyze in the present section. F. Solmsen, *Aristotle's System of the Physical World: A Comparison with his Predecessors*, Ithaca, New York: Cornell University Press 1960, 312 ff., and Moraux, *op. cit.* (*supra*, n. 25), CXXVI ff., are good on the three main issues addressed by Aristotle and on his own theory of natural place and natural movement as the answer to all the puzzles.

Aristotle's discussion is in part anticipated in the so-called autobiography of Socrates in the *Phaedo*. At *Phaed.* 97d-e, Socrates says that he expected Anaxagoras to tell him whether the earth is flat or round (πλατεῖα [cf. *Cael.* 293b34] ... ἢ στρογγύλη), and why it has the shape it has. At 99b-c, he addresses the question why the earth is at rest (μένειν), and points out that one person puts a whirl (δίνην—cf. *Cael.* 295a13) around it, whereas another treats it as a flat lid supported on a base of air (ὥσπερ καρδοπ(ί)φ πλατεῖ(φ) βάθρον τὸν ἀέρα ὑπερείδει—cf. *Cael.* 294b15, ἐπιτωμάζειν). One may perhaps assume that these—and other—alternatives were already listed in a work composed by one of the Sophists; cf. *supra*, n. 17 and text thereto. Aristotle answers the question of the why which Plato has Socrates put to Anaxagoras in his own way, viz. by appealing to the theory of natural motion and natural place.

¹²⁴ Why does Aëtius treat the earth in book III, i.e. after the meteorology, and not, as Arist. in the *Cael.*, after the heavens and the heavenly bodies, i.e. in book II of the *Plac.*? One of the possible answers, I believe, is that on the one hand III 15, on earthquakes, involves the position and motion of the earth, and that on the other Arist. *Mete.* B 4-6 discusses winds (with an excursus in ch. 5 on the habitable zones of the earth, see immediately below) and *ibid.* 7-8 earthquakes. In Aëtius, the chapter on winds (III 7)

Arist. *Cael.* B 13.293a15-7 begins by listing three questions that have to be answered, viz. in the categories of place, quantity, and quality: "It remains to speak of the earth, (that is to say) where [οὗ] it is situated,¹²⁵ of the question whether it belongs to what is at rest or what is in motion,¹²⁶ and of its shape (περὶ τοῦ σχήματος)."¹²⁷ On these three problems and the dialectical manner in which they are treated compare Alexander *In Cael.* 511.15 ff., τρία οὖν ... προβαλλόμενος περὶ τε τῆς θέσεως αὐτῆς, ... , καὶ δεύτερον, πότερον τῶν ἡρεμούντων ἐστὶν ἢ τῶν κινουμένων, καὶ τρίτον περὶ τοῦ σχήματος αὐτῆς, τὰς προκαταβεβλημένας καὶ περὶ τούτων δόξας πρῶτον ἐκτίθεται καὶ πρὸς αὐτάς ὑπαντήσας οὕτω τὰ δοκοῦντα ἑαυτῷ περὶ τούτων συλλογίζεται (my emphasis). The questions are then discussed in succession, but the discussion of each separate question may also involve each of the others; the earth, for instance, may be believed to be at the centre because it is at rest, and its remaining there may be believed to be caused by its shape. A question which is not separately listed by Aristotle, viz. how many earths there are, but explicitly listed and dealt with at Aët. III 9, is tackled in the course of the treatment of some of the other issues.

I shall begin by following Aristotle's discussion and then give the parallels in ps.-Plutarch/Aëtius. I shall also cite such parallels as are available at Cic. *Ac. pr.* II 122-3, the relation of which to the *Placita* literature has not been realized by previous scholars, although *ibid.* II 118, on the principles,¹²⁸ and II 124, on the soul,¹²⁹ have long been recognized as belonging with the *Placita*.

Aristotle begins with the position (θέσις)¹³⁰ of the earth, 293a17 ff., and points out—the diaeresis is stated in a rather off-hand way—that among those who hold the universe to be finite¹³¹ the majority (τῶν πλείστων) place the earth at the centre, with the exception of the Pythagoreans, who put a fire at the centre, have the earth move about this like any other star, and add another earth which they

is separated from the series dealing with the earth by one chapter only, viz. that on summer and winter (III 8). We should also cite III 11.4 and III 14, which, as to the issue treated, may be compared with *Mete.* B 5.362a32 ff. (see *infra*, n. 157). In other words, in Aëtius the meteorology has been interpolated in the cosmology because the chapters on the substance, position, etc., of the earth were put before the chapter on earthquakes.

¹²⁵ Cf. Aët. III 11.

¹²⁶ Cf. Aët. III 13.

¹²⁷ Cf. Aët. III 10.—In the last sentence of ch. 13 Aristotle enumerates these three issues again and says they have now been dealt with.

¹²⁸ See my paper quoted *supra*, n. 7, also for references to the learned literature.

¹²⁹ See *supra*, text to n. 90.

¹³⁰ Cf. 293b15, τόπον.

¹³¹ Those who do not seem to be Anaximenes, Anaxagoras, and the Atomists (see 294b13 ff.). The first division is between those who say the universe is infinite and those who say it is finite; the next is between those finitists who put the earth at the centre and those who do not.

call counter-earth. We may note that this is a neat diaeresis of opposed views. We may also note that Aristotle is explicit that the positioning of the earth by the Pythagoreans entails that it moves, and further that he has them posit two earths instead of one as all the others do. He returns to this point at 293b15 ff., where he begins to deal more explicitly with the question of motion v. rest. Those who do not place it at the centre (viz. the Pythagoreans) have both the earth and the counter-earth move about the centre. Aristotle then interpolates the view of those—no names provided—who, although they put the earth at the centre, argue that the eclipse of the moon or the sun is caused by bodies close to the earth which circle about it and which we do not see because of this closeness.¹³² Some others posit another view; although they place the earth at the centre, they (do not say it is at rest but) have it move about the axis, “as is written in the *Timaeus*”.¹³³

In this dialectical overview—in the course of which he also provides numerous counter-arguments of his own, e.g. at 293a25 ff. against the speculative δόξας of the Pythagoreans—, Aristotle again and again emphasizes the disagreement and opposition among the experts. The view (δόξαν, 293b16) of the Pythagoreans is expressed as the opposite (ἐναντίως, 293a20) of that of the majority who place the earth at the centre. Similarly as to motion and rest, for not all the experts share the same assumption (οὐ ... τὸν αὐτὸν τρόπον κτλ., 293b16-7).

There is a similar disagreement as to the shape of the earth (περὶ τοῦ σχήματος ἀμφισβητεῖται, 293b33 ff.). The diaeresis provided by Aristotle is as follows: some say it is like a ball (σφαίροειδής), others that it is flat (πλατεῖα) and has the shape of a tambourine (τὸ σχῆμα τυμπανοειδής). One of the arguments of the latter is that it must have this shape because it is at rest, or vice versa. We may notice that Aristotle here does not distinguish between those who say the universe is infinite and those who say it is finite.

There are indeed according to Aristotle many different ways (τρόποι πολλοί) in which the movement and/or rest of the earth have been explained. Numerous suggestions—entailing however further difficulties—have been made. Some, like

¹³² The *tertium comparationis* with the Pythagorean view seems to be that these are extras, just as the counter-earth, and equally invisible to us.

¹³³ *Tim.* 40b-c; for γέγραπται cf. Arist., *De sensu* 2.437b11-12. H. Cherniss, *Aristotle's Criticism of Plato ...* (see *supra*, n. 123), 551 f., argues that not Aristotle himself but the ἔννοιαι quoted the *Tim.* passage, viz. in support of their own doctrine, and he identifies these “some” as Heraclides, against whom in his view Aristotle’s argument is directed. Cherniss’ reading of Aristotle’s clause—although it helps to understand the distortions in the later doxographies, for which see *infra*—is laboured; one may, moreover, observe that Aristotle does not say that this interpretation of the *Tim.* passage is false. Furthermore, it just is not true that Aristotle at 293b30-2 refers to a theory which “makes the heavens stationary” (Cherniss, *op. cit.* 550) and so cannot be shared by Plato (to whom Aristotle elsewhere always ascribes the view that the heavens move). The heavens simply are not at issue at all in this section, which is about the earth only.

Xenophanes of Colophon, said that the nether side of the earth is infinite (294a21 ff., ἄπειρον τὸ κάτω τῆς γῆς εἶναι φασιν¹³⁴). Others, like Thales of Miletus—according to some authorities—, say that it rests upon water; this is the oldest explanation we know of. Aristotle gives counter-arguments to this solution and inserts a general point, a sort of moral which has to do with the proper way to conduct an investigation in science. We are all inclined to consider the views of our opponents rather than the difficulties contained in the issue itself, he says; even when one is one's own opponent, satisfaction is reached when he can no longer find objections (ἀντιλέγειν) to his own idea. But this sort of dialectic is not enough. "If one wants to investigate a problem in the way that is appropriate, one must be an objector who avails himself of the objections that are proper to the genus, and this is realized when one has considered all the differences".¹³⁵ The genus,¹³⁶ apparently, is physics, or rather that part of it which involves the theory of natural motion and natural rest and the nature of earth as a whole (and not, e.g., that of objects floating on water), and the diaereses one has to apply must be exhaustive.

He then (294b13 ff.) goes on with (the infinitists) Anaximenes and Anaxagoras and Democritus, who say that the flatness (τὸ πλάτος—cf. 293b34) of the earth is the cause of its remaining where it is—viz. in a cosmos surrounded by a firmament. For it does not cut through the air underneath it but covers this like a lid (ἐπιπωμαίνει) and compresses it. The arguments provided, e.g. the analogy with flat bodies which are hard to move against the wind, are according to Aristotle unsatisfactory and easily refuted; moreover, it is the size (μέγεθος, 294b25) of the earth rather than its flat shape which prevents the supporting air from escaping. But he has a more general point—which resumes the moral of 294b14 ff.:

(294b30 ff.): In general, the point of contention (ἀμφισβήτησις) against those who deal with motion in this way is not concerned with parts, but with something that is a whole and with all of this whole (περὶ ὅλου τινὸς καὶ παντός).¹³⁷ For first of all one has to settle the question whether bodies possess a natural motion or none at all, and whether it (scil., motion) does not exist by nature but does so by constraint.

¹³⁴ Some mss add ἐπ' ἄπειρον αὐτὴν ἐρριζῶσθαι λέγοντες, which is bracketed by editors as a gloss. See however *infra*, text to n. 141.

¹³⁵ 294b10-13, διὸ δεῖ τὸν μέλλοντα καλῶς ζητήσιν ἐνστατικὸν εἶναι διὰ τῶν οἰκειῶν ἐνστάσεων τῷ γένει, τοῦτο δ' ἐστὶν ἐκ τοῦ πάσας τεθεωρηκέναι τὰς διαφοράς. Cf. Alexander *ad loc.*, *In Cael.* 523.30 ff., who refers to the treatment of the *differentiae* and of among other things the finding of propositions (523.31, τὸ προτάσεις εὑρεῖν) in the *Topics*.

¹³⁶ For this use of the term genus see *Top.* A 14 and *Rhet.* A 2, quoted *supra*, § III.

¹³⁷ For this whole which is to be treated in full see the passage from *Top.* A 14 quoted *supra*, § III, and note the "whether ... or not" form of the questions that follow.

Aristotle deals at some length with this preliminary issue, which alone allows one to state correctly and to answer in a satisfactory way the questions concerned with the that (ὅτι) and the why (διότι). He again says that the others have tried to find the cause (αἰτίαν, 295a15) for the being at rest of the earth and that for this reason some have referred to its flat shape and size. But some others, e.g. Empedocles, have adduced the movement of the heavens and the cosmic whirl (295a16 ff.). Such a view entails a doctrine concerned with the coming to be of the earth (295a9 ff.); indeed, all those who state that the universe has come into being (πάντες ὅσοι τὸν οὐρανὸν γεννῶσιν) say that the earth came together at the centre.¹³⁸ Empedocles' view is refuted at length by means of the theory of natural motion and rest, which without doubt is the reason why it is adduced at precisely this place. Finally, Aristotle mentions some who say, just like Anaximander among the ancients, that it remains in place because of the equality (ὁμοιότητα), i.e., because there is no sufficient reason for it to move in any direction since it is equally far removed in all directions from what surrounds it (295b11 ff.).¹³⁹

We do not have to deal here with the many acute observations and objections scattered throughout Aristotle's account of the tenets concerned with the position, motion v. rest, and shape of the earth. We turn instead to the parallels in Cicero and ps.-Plutarch/Aëtius.

Aristotle's diaeresis between those who say the earth is at the centre and those who say it is not, is paralleled at Cic. *Ac. pr.* II 122 in the form of a *diaphonia* without name-labels: "is it possible for us ... to find out whether the earth is firmly fixed deep down and holds so to speak by its own roots, or hangs suspended at the centre [*media pendeat*]?" We may note that Cicero (or rather his source) includes—but Aristotle himself had already made clear the links between the various issues—the questions relating to the earth being at rest and to its shape. The formula "*media pendeat*" allows one to fill in various names found in Aristotle (who had said it is the view of the majority), e.g. Anaximander, or Anaximenes and Anaxagoras and Democritus. The opposed tenet is not that of the Pythagoreans, as in Aristotle, but that of Xenophanes, also found in Aristotle; we may note that Cicero's formula "*penitusne defixa sit et quasi¹⁴⁰ radicibus suis haereat*" corresponds closely to that found in some mss of the *Cael.* at B 13.22-3, ἐπ' ἄπειρον αὐτὴν ἐρριζώσθαι.¹⁴¹ Somewhat later Cicero deals with the question whether the earth moves, and describes the outrageous

¹³⁸ Aristotle does not deal with the various explanations of the *genesis* of the earth that were available.

¹³⁹ This is refuted by a special argument involving natural motion, for also fire, if at the centre of things, will not move for the same reason.

¹⁴⁰ As a rule, Cicero uses "*quasi*" to indicate he translates from the Greek.

¹⁴¹ Cf. *supra*, n. 134. *Schol. Basil.* 201.2 Pasquali (*Vorsokr.* 28B15a), Παρμενίδης ἐν τῇ στιχοποιίᾳ ὑδατόριζον εἶπε τὴν γῆν, mentions Parmenides only, but a fuller version

theory of Hicetas of Syracuse (a Pythagorean) and of Plato. I quote this passage (Ac. pr. II 123) in full:

Hicetas of Syracuse, as Theophrastus says,¹⁴² holds that the heaven, the sun, the moon, the stars, in short all the things on high are at rest and that nothing in the world is in motion except the earth, which because it rotates and twists about the axis in an extremely fast way brings about exactly the same (effects) as would be (brought about) if the earth were at rest and the heaven in motion. And some believe that this is also what Plato says in the *Timaeus*, although (he does so) in terms that are a bit more obscure.

We may note first that, *grosso modo*, this section corresponds to *Cael.* B 13.293a20-b32, where Aristotle, as we have seen above, first describes the heterodox cosmology of the Pythagoreans, who have the heavens, the planets, the sun, the moon, the earth and the counter-earth circle about a central fire, and concludes with a reference to the passage in the *Tim.* where in his view Plato has the earth move about the axis. There can be no doubt that what is in Cicero ultimately goes back to this *Cael.* passage. This helps to explain the reference to Theophrastus, who apparently figures as an intermediary source. But some rather odd things have happened along the lines of transmission in the tradition.

First, the view of Plato—according to “some”—is put on a par with that of Hicetas; on the other hand—and not merely according to “some” but, as Cicero says, according to no less an authority than Theophrastus—the Pythagorean Hicetas, just as Plato, put the earth at the centre of the cosmos. Presumably, Theophrastus identified at least one of Aristotle’s ἐνιοί at *Cael.* B 13.293b30. We may here add another reference to Theophrastus (without book-title again, but attributed by Usener and Diels to the great doxographic treatise) found at Plut., *Plat. Quaest.* VIII, 1006C (= Theophr., *Phys. op.* fr. 22; paralleled at *Num.* c. 11, 67D, quoted by Diels in *apparatu*). According to this passage, Plato repented, when he had grown older, of having put the earth in the centre of things, because this position of honour was not befitting to it. This information is otherwise without parallel. At first sight, it would seem that what is reported

of this scholium published by Th. Polyakov, “The unpublished doxographical scholia on St. Basil’s *Hexaemeron*”, *Revue d’Histoire des Textes* 12-3 (1982-3), 368 f., runs, Διογένης ὁ Ἀπολλωνιάτης ὑπὸ ἀέρος φέρεσθαι ἔφη τὴν γῆν· Παρμενίδης ἐν τῇ στιχοποιίᾳ ὑδατόριζον εἶπε τὴν γῆν· Ξενοφάνης ὁ Κολοφώνιος οὐκ οἶεται μετέωρον εἶναι τὴν γῆν, ἀλλὰ κάτω εἰς ἄπειρ(ον) καθήκειν. Note that *ap.* Pasquali 202.2-3 (on the earth’s immobility) Parmenides and Xenophanes are mentioned together as well, see *infra*, n. 147.

¹⁴² The passage is printed as *Phys. op.* fr. 18 by Diels, who however omits the clause about Plato.

here is an unwritten doctrine of which no other traces are to be found; perhaps, however, we may simply assume that Theophrastus—who also got other facts wrong at times—provided a wrong interpretation of a passage in a later Platonic dialogue. If Plutarch is not mistaken and reports Theophrastus' statement more or less correctly, the note about Plato's change of mind may be explained as a further comment on *Cael.* B 13.293b30-2, just like the one about Hicetas. According to Theophrastus, then, Plato in the *Timaeus* put the earth at the centre but later preferred the position Aristotle ascribes to the Pythagoreans. One should note, however, that at *Plat. Quaest.* 1006C Plutarch evidently relies on a post-Theophrastean doxographic account, for he also mentions the doctrines of Aristarchus and Seleucus, to whom, in rather unclear words, he ascribes the view that the earth is not stationary but is "turning and wheeling" (στρεφομένην καὶ ἀνειλουμένην). This phraseology recalls the discussion about the interpretation of ἰλλομένην at *Tim.* 40b-c, and so seems to involve a central earth which turns about its axis. But what Plutarch means is that according to Aristarchus and Seleucus the earth moves about the centre the way the planets do, and he argues that the same option is theoretically possible with regard to Plato's doctrine; however, Theophrastus' μεταμέλειν in Plutarch's view apparently precludes that this can be correct for the *Tim.* Theophr. *Phys. op.* fr. 22 is baffling to a degree.

We must return to Cicero's report. As a second point we may observe that the astronomy attributed to Hicetas is absurd,¹⁴³ because the astronomical phenomena cannot be explained on this assumption. Whatever Hicetas may have said (or Theophrastus may have said he said), his theory as reproduced here has been flattened out into a *doxa* which is only functional in the context of a *diaphonia*. Interestingly, the *doxa* that must have been opposed to that of Hicetas has been preserved elsewhere in a different context. At *Aët.* II 16—the chapter on the motions of the stars—the equally surprising view that "all the stars" (πάντας τοὺς ἀστέρας) move from east to west is attributed in the first lemma to Anaxagoras, Democritus, Cleanthes (the name-labels do not matter). Because the next two lemmata (II 16.2-3) speak of the opposite movement of the planets from west to east, the implication of the first lemma of this chapter must be that according to the experts listed there no such counter-movements exist.

The most plausible assumption is that in some way or other the absurd tenet of Hicetas was spun out of an argument formulated by Aristotle at *Cael.* B 8.289b4-7. Here Aristotle says that it is impossible that both the heaven and the stars (i.e. the planets, the sun, and the moon) are stationary if the earth is stationary too. *The earth, however, must be assumed to be stationary;* accordingly, either the heavens and the set of heavenly bodies are both in motion,

¹⁴³ Cf. J. Burnet, *Early Greek Philosophy*, London: Adam & Charles Black 41930, repr. 1952, 300 n. 1, and W. Burkert, *Lore and Science in Ancient Pythagoreanism*, Cambridge Mass.: Harvard University Press, 341 n. 17.

or the one is in motion while the other is stationary, and conversely. This formula allows for two options, viz. (a) one according to which the earth and the heaven are stationary while the heavenly bodies are in motion, and (b) one according to which the earth and the heavenly bodies are stationary while the heaven is in motion. But from a purely logical—or rather dialectical—point of view (one not concerned with saving the phenomena) a third option is open. If one rejects Aristotle's premise that the earth must be stationary and posits that it moves, both the heaven and the heavenly bodies may be stationary. This is precisely the tenet ascribed to Hicetas and, according to "some", to Plato in Cicero's account.

We should however take into account that the theory that the earth rotates about (its) axis and that the sky and the heavenly bodies stand still is three times attributed to Heraclides of Pontus by Simplicius (*In Cael.* 444.32 ff. = fr. 108 Wehrli,¹⁴⁴ 519.9 ff. = fr. 106 W., 541.27 ff. = fr. 107 W.).¹⁴⁵ Accordingly, the doctrine as such has not been invented by Cicero, and it is not a mere misunderstanding on his part but derives from a tradition. Simplicius does not quote chapter and verse, and in the third passage cited he oddly attributes this impossible theory to Aristarchus as well! (A better version of Aristarchus' doctrine has been preserved elsewhere in Aëtius, viz. at II 24.8). We may assume that Simplicius' source of information concerning Heraclides, just like Cicero's, was a version of the *Placita* (or an earlier commentator—perhaps Alexander who is often cited by Simplicius in this commentary—using a predecessor of Aëtius). At *In Cael.* 519.9 ff., at any rate, the reference to Heraclides has been tagged on to an extensive discussion, beginning at 517.6 ff., of what Aristotle says about what is meant at *Tim.* 40b-c. At ps.-Plut./Aët. III 13.3, part of the doctrine Cicero attributes to Hicetas and Plato, and Simplicius to Heraclides and Aristarchus, viz. the tenet that the earth revolves about the axis, is attributed to Heraclides and Ecphantus.¹⁴⁶ We may note in passing that Simplicius finds it difficult to grasp how the theory of this Heraclides may be made to fit the astronomical phenomena.

Thirdly, one understands why Diels omitted the clause about Plato from the part he printed as a Theophrastus fragment, for one may well wish to exclude

¹⁴⁴ F. Wehrli, *Die Schule des Aristoteles*. H. VII: *Herakleides Pontikos*, Basel-Stuttgart: Schwabe & Co 1969. On these passages see also Cherniss, *Aristotle's Criticism of Plato* ... (cf. *supra*, n. 123), 551 f., who believes Heraclides (appealing to *Tim.* 40b-c) held such a doctrine; but Procl., *In Tim.* IV 281e (Heracl. fr. 105 W.) does not prove that Heraclides appealed to the *Tim.*

¹⁴⁵ On these passages see H. B. Gottschalk, *Heraclides of Pontus*, Oxford: Clarendon Press 1980, 59 ff.; see further *infra*, n. 160 and text thereto. The sensible astronomical system Gottschalk reconstructs for Heraclides (see his summary, *ibid.* 82) differs from that described by Simplicius, as does that provided by Cherniss, *Aristotle's Criticism of Plato* ... (cf. *supra*, n. 123), 556.

¹⁴⁶ See *infra*, p. 107 f.

the possibility that Theophrastus could have said about Plato what Cicero says (but Diels was not bothered by the fact that Plato's view of the rotation of the earth about the axis is attributed to Hicetas). However, we may assume that the tenet of Plato has been distorted in a similar way as that of Hicetas and therefore belongs with the doxographic lemma. Cicero had studied and even translated the *Tim.* (the translation is believed to have been made in the same year as the *Ac.* and *Tusc. disp.*), so he was familiar with Plato's doctrine. As a matter of fact, in his translation (Cic., *Tim.* 37, "*quae traiecto axi sustinetur*") Cicero comes down in favour of the interpretation according to which Plato's earth does not move, an interpretation about which he does not say a word in *Ac. pr.* II 123.¹⁴⁷ What he does say there about Plato's view "according to some", however, can be explained: it is a much distorted version of what Aristotle says about "some" and "e.g. Plato":

Ac. pr. II 123

Cael. B 13.293b30-2

(Hicetas' view):

terram ... , quae *circum axem*
se summa celeritate convertat
et torqueat [...]; *atque hoc*
etiam Platonem in Timaeo
dicere quidam arbitrantur, sed
paulo obscurius.

ἐνιοὶ δὲ καὶ κειμένην ἐπὶ
τοῦ κέντρου φασὶν αὐτὴν
ἰλλεσθαι καὶ κινεῖσθαι
περὶ τὸν διὰ παντὸς
τεταμένον πόλον, ὥσπερ
ἐν τῷ Τιμαίῳ γέγραπται.

Aristotle's "some" who, like Plato in the *Tim.*, say the earth moves about the axis have become "some" who believe that Plato said such a thing in the *Tim.*

We may now turn to the parallels in ps.-Plutarch/Aëtius,¹⁴⁸ where the problems that are interconnected in Aristotle have been neatly and pedantically separated,

¹⁴⁷ On the two contrasting interpretations of *Tim.* 40b8 ἰλλομένην in antiquity see P. Kraus - R. Walzer (edd.), *Galenii compendium Timaei Platonis*, Corpus Platonium Medii Aevi, Plato Arabus vol. I, London: In aedibus instituti Warburgiani 1951, 13, and the passages quoted there; cf. also H. Cherniss, Plutarch's *Moralia* XIII.1, Loeb Classical Library No. 427, Cambridge Mass.: Harvard University Press/London: William Heinemann Ltd 1976, 78 f. n. d (cf. also *supra*, n. 133). That the Platonic *doxa* here cited by Cicero derives from the *Plac.* is corroborated by the *diaphonia* in, and the contents of, the lemma at *Schol. Basil.* (cf. *supra*, n. 83) 201.3-6 Pasquali, τὴν γῆν ἀκίνητον ἔφη Παρμενίδης ὁ Ἐλεάτης, Ξενοφάνης ὁ Κολοφώνιος· Πλάτων δὲ αὐτὴν ἰλλεσθαὶ φησι περὶ τὸν διὰ παντὸς τεταμένον πόλον, ὅπερ ἂν εἴη στρέφεσθαι· ἀλλὰ μὴν καὶ Ἀριστοτέλης καὶ οἱ ἀπὸ τῆς Στοᾶς ἀκίνητον ἀπέλκον τὴν γῆν. The text ends with a reference to Strato which I omit; it is printed as Strato fr. 90 Wehrli—who does not refer to Pasquali's edition—from J. A. Cramer, *Anecdota graeca e codd. manuscriptoris bibliothecarum Oxoniensium*, Oxford: E typographico academico 1836, vol. III 413.

¹⁴⁸ For the list of chapter-titles relating to the earth see *supra*, § VI *ad finem*.

although some connections are still visible, and where other specific questions have been given separate chapters.

In ps.-Plutarch, Aët. III 9 has the title *περὶ γῆς καὶ τίς ἡ ταύτης οὐσία καὶ πόσαι*;¹⁴⁹ in Stobaeus¹⁵⁰ it runs *περὶ γῆς καὶ εἰ μία καὶ πεπερασμένη καὶ ποίου μεγέθους*. Accordingly, a number of distinct questions—substance, number, size—have been coalesced into one chapter. The impression that ps.-Plutarch abridged Aëtius to a considerable extent and that Aëtius probably did the same with his source, or sources, is hard to avoid. In *Cael.* B 13 there is no corresponding separate section, but some of the items found in ps.-Plutarch correspond to points touched upon in passing by Aristotle.

The first diaeresis and *diaphonia* at Aët. III 9.1-2 is between Thales and his followers who said there is one earth, and “Hicetas the Pythagorean” who said there are two, viz. our earth and the counter-earth. In other words, the theory attributed by Aristotle to the Pythagoreans in general is here given to Hicetas only. We may observe that the information about Hicetas’ *tenet* at Aët. III 9.2 flagrantly contradicts that found at Cic. *Ac. pr.* II 123—citing Theophrastus as quoted above—, which has Hicetas put our earth at the centre. The next division and *diaphonia* (9.3-4) opposes the Stoics, who assume that there is one finite earth, to Xenophanes who said that its nether part is rooted in infinity (*εἰς ἄπειρον ἐρριζώσθαι*). Xenophanes’ doctrine, as we have noted above, is found both in Aristotle and—without name-label—in Cicero. We have also seen that the words *ἐπ’ ἄπειρον ... ἐρριζώσθαι* in the text of Aristotle, lacking in a number of mss, are bracketed by editors. The parallel in Cicero proves that already before Aëtius the *Placita* contained this expression relating to Xenophanes’ view; I, for my part, am not certain that the square brackets in Aristotle’s text are justified. At the very least, one must assume that a student of the *Cael.* adduced the *Placita* and jotted down *in margine* what he found there, which sheds some light on one of the uses a doxography could be put to. But why, one may well ask, should he make a note about Xenophanes and not about others on whom Aristotle provides less information?

In the Xenophanes lemma, we further read that according to Xenophanes the earth has been compacted (*συνπαγῆναι*) from air and fire; obviously, this is a point pertaining to the οὐσία of the earth. This information is not paralleled elsewhere, but we have seen that Aristotle speaks in passing of all those who have the earth come together (*συνελθεῖν*, 295a9,14) at the centre. We may therefore assume that one of the predecessors of Aëtius paid some attention to the *genesis* of the earth during the cosmogony. In the next lemma (III 9.5),

¹⁴⁹ So the ms followed by Mau in the Teubner edition; Diels only prints *περὶ γῆς*.

¹⁵⁰ For Stobaeus, only the titles survive; the text (except for III 15.10) is lost. Theodoret does not adduce Aët. III. This means that the chapters cannot be adequately reconstructed.

at any rate, we read that according to Metrodorus the earth is the ὑπόστασιν καὶ τρύγα τοῦ ὕδατος, τὸν δ' ἥλιον τοῦ ἀέρος. The tenets of Xenophanes and Metrodorus concerned with the substance of the earth are in this way opposed to one another. The clause about the sun according to Metrodorus comes as a surprise. It looks like a sort of footnote, for the sun is not the subject of this chapter;¹⁵¹ it may have been appended because of the air which according to Xenophanes in the previous lemma is one of the two elements from which the earth is formed and which in this lemma is the element from which according to Metrodorus the sun is formed.

The next chapter, III 10 on the shape of the earth, corresponds to a question explicitly raised by Aristotle; some details are also the same. The main diaeresis, in ps.-Plutarch as in Aristotle, is between those who say the earth is like a ball and those who say it has a flat (or comparatively flat) shape. Interestingly enough, the view that it is like a ball (σφαίροειδής—the same term as at *Cael.* 293b33) is at III 10.1 attributed to Thales (!) and the Stoics and their followers. This is a splendid example of the cavalier way in which in the *Placita*, and especially in ps.-Plutarch, name-labels may be attached to tenets. In ps.-Plutarch, four further tenets follow: of Anaximander (text incomplete in the Greek version¹⁵²), who said it resembles a column-stone, of Anaximenes, who said it is shaped as a table, of Leucippus who said it is shaped as a tambourine, and of Democritus who said that it is shaped as a disk but hollow at the middle. We should note the word for “shaped like a tambourine”, τυμπανοειδής; this is the same word as at *Cael.* 293b33-294a1—where, however, we find no name-label—and a *hapax* in both ps.-Plutarch and Aristotle.¹⁵³ This is very solid evidence for ultimate dependence. We may recall that at *Cael.* 294b13-4 Aristotle lists Anaximenes, Anaxagoras (lacking in this chapter of ps.-Plutarch),¹⁵⁴ and Democritus as assuming that the earth is flat without, however, providing more detailed information about the shapes involved.¹⁵⁵ We may further note that the same names are mentioned at *Mete.* B 7.365a14 ff. as the authors of the three explanations of earthquakes which Aristotle says have come down to us: “Anaxagoras of Clazomenae and before him Anaximenes of Miletus ... , and after them

¹⁵¹ For Metrodorus on the sun see Aët. II 20.6 (ps.-Plutarch: μύδρον ἢ πέτρον διάπυρον) and 8 (Stobaeus: πύρινον, and Theodoret: μύδρον ἢ πέτρον διάπυρον). What we find there is not easily squared with what we have here.

¹⁵² Diels' reference *ad loc.* to the parallel in Hippolytus may now be doubted because the Arabic version is complete *ad finem*: “... und ihre Flächen sind gebogen”.

¹⁵³ At *Mete.* B 5.362a35 (see *infra*, n. 157) Aristotle says that each of the habitable portions of the earth has the shape of a tambourine (οὔσης οἷον τυμπάνου—τοιούτου γὰρ σχῆμα κτλ.). At Simplicius *In Cael.* 547.6.25 (comm. on *Cael.* II 14.297b23 ff.), the word τυμπανοειδής presumably derives from Aristotle.

¹⁵⁴ But cited in the chapter on earthquakes, III 15.4, although not for the shape of the earth.

¹⁵⁵ I add a few more doxographic passages devoted to this issue, where the main

Democritus of Abdera". Aristotle here is explicit about the relative chronology,

diaeresis is again between those who posit that the earth is flat and those who posit that it is spherical. (1) Martianus Capella, VI 590-2 (590-1 = Dicaearchus fr. 108 Wehrli), opposes three views—subsequently adding a name-label to the first only—and opts for the third: "*formam totius terrae non planam, ut aestimant, positioni qui eam disci diffusioris* ["a wide disk"] *assimulant, neque concavam, ut alii, qui descendere imbrem dixere telluris in gremium* [the same explanation as in Cleomedes, see *infra*], *sed rotundum, globosum etiam sicut Secundus Dicaearchus asseverat* [...]. [The next clause I quote is not in either Wehrli or Vorsokr. or Lanza, but the text as a whole is nr. 433 in D. E. Gershenson - D. A. Greenberg, *Anaxagoras and the Birth of Physics*, New York etc.: Blaisdell Publishing Company 1964, 208 f.:] *illam priorem, cui etiam physicus Anaxagoras accessit, praestat exigere.*" Wehrli and the latest editor of Martianus, J. Willis (Leipzig: B. G. Teubner Verlagsgesellschaft 1983) follow Dick in bracketing "*sicut Secundus*" as a marginal gloss (Pliny, *N. H.* II 162 = Dic. fr. 105 W. says that the earth "*globum efficit*"—cf. Martianus' "*globosum*"—and adds that Dicaearchus supported this view). But one should bracket "*Dicaearchus*" as a marginal gloss. Someone looked up the passage (i.e. *N. H.* II 162) referred to by Martianus and wrote the name subsequently added by Pliny in the margin of his copy; by bracketing "*Dicaearchus*" we moreover get a better sentence. Mart. VI 592-5 is much indebted to Pliny, see Willis' upper apparatus. Accordingly, Martianus' overview at the beginning of his Plinian account of the shape of the earth depends on a version of the doxographic vulgate; this is rendered certain by the reference to Anaxagoras, a name lacking in Pliny. Dic. fr. 108 W. may be written off. (2) Cleomedes I 8.2 (74.1-13 Ziegler) at the beginning of his detailed discussion of the shape of the earth refers to the views—no name-labels—which disagree among themselves and with that of his school, and to that of the mathematicians and the followers of Socrates which is the same as his own: πλείους τοίνυν διαφοραὶ περὶ τοῦ κατὰ τὴν γῆν σχήματος παρὰ τοῖς παλαιότεροις [we recall that, apart from the Stoics, ps.-Plutarch lists Thales, Anaximander, Anaximenes, Leucippus, Democritus, and that Martianus mentions Anaxagoras] τῶν φυσικῶν γεγονάσιν. οἱ μὲν γὰρ αὐτῶν ... πλατεῖ καὶ ἐπιτέδῳ τῷ σχήματι κεχρησθαι αὐτὴν ἀπεφώναντο. ἕτεροι δὲ ὑπονοήσαντες ὅτι μὴ ἂν διέμενε τὸ ὕδωρ ἐπ' αὐτῆς εἰ μὴ βαθεῖα καὶ κοίλῃ τὸ σχῆμα ἦν [cf. *supra*, Martianus], αὐτῷ τούτῳ κεχρησθαι τῷ σχήματι ἔφασαν αὐτήν. ἄλλοι δὲ κυβοειδῇ καὶ τετράγωνον εἶναι αὐτὴν ἀπεφώναντο, τινὲς δὲ πυραμοειδῇ. οἱ δὲ ἡμέτεροι [scil., the Stoics] καὶ οἱ ἀπὸ τῶν μαθημάτων πάντες καὶ οἱ πλείους ἀπὸ τοῦ Σωκρατικοῦ διδασκαλείου σφαιρικὸν εἶναι τὸ σχῆμα τῆς γῆς ἀπεφώναντο. R. Goulet, *Cléomède: Théorie élémentaire*, Histoire des doctrines de l'antiquité classique, Paris: Librairie philosophique J. Vrin 1980, 199 n. 155, argues that this passage is "moins doxographique ... que théorique", because Cleomedes considers the suitable forms among which the physicist has to choose. Goulet refers to the parallel procedure at Ptolem., *Almagest* I 4; however, Ptolemy—who lists as shapes (other than the spherical which must be assumed) concave, triangular or square or any other polygonal shape, and cylindrical—differs from Cleomedes in that he does not explicitly refer to the disagreement among the experts. If for a moment one forgets Cleomedes' sentence concerning the cube and the pyramid, the three views listed are the same as in Martianus. Furthermore, a listing of possible shapes is by no means foreign to the doxographic literature; cf. Aët. II 2.1 (in the chapter "On the shape of the universe"), where not only the view that it is spherical but also the view that it has the shape of a cone (!) or an egg are listed. Aristotle and many others, among whom Cleomedes, insist that the universe, the heavenly bodies, and the earth must have the same shape. In this way, the fact that according to "some" at Aët. II 2.1 the universe has the shape of a cone explains—from

so we may assume that the order of the names at *Cael.* 294b13-4 implies a chronological sequence too. For the relation of the views concerned with earthquakes (III 15 in ps.-Plutarch) to the views concerned with the position and shape of the earth see below.

The chapter which follows, III 11, is about the position of the earth, a theme which corresponds exactly to a question explicitly addressed by Aristotle. The main diaeresis, as in Aristotle, is between those who say that the earth is at the centre and those who deny this. The first view is at III 11.1 attributed to Thales and his followers, which amounts to a noteworthy simplification when compared with what Aristotle says about Thales, Anaximander, Anaximenes, and Anaxagoras. Two views are then opposed (*diaphonia* again) to the tenet that the earth is at the centre. At 11.2 Xenophanes' view is said to be that the earth is first (πρώτην) because it is rooted in infinity (εἰς ἄπειρον ἐρριζώσθαι—precisely the same expression as at III 9.4). Although Aristotle, as we have seen above, ascribes this tenet to Xenophanes as well, he does not contrast the majority view that the earth is at the centre with that of Xenophanes in the same way as ps.-Plutarch. But the *diaphonia* as found at Cic. *Ac. pr.* II 122 quoted above, viz. the opposition between those who say that the earth is suspended at the centre and those who say it is rooted deep down, is a perfect parallel to what is in ps.-Plutarch. Next, at 11.3, the Pythagorean view which Aristotle opposed to the majority view concerned with the earth at the centre is reproduced

a doxographic point of view, of course—why at II 14.2 Cleanthes is said to have attributed a conical shape to the stars, and conversely. This also becomes clear from a garbled passage which was pointed out to me by D. T. Runia. Here the shape of the universe has been mixed up with that of the earth, and here we find a parallel for the “square cube” listed by Cleomedes: (3) Marius Victorinus, *Explanationes in Rhetoricam M. Tullii Ciceronis*, ap. C. Halm, *Rhetores latini minores*, Leipzig: B. G. Teubner 1863, 176.17-21: “*Quae sit mundi facies*: multi enim dicunt mundum in modum sphaerae esse collectum, multi oblonga rotunditate esse formatum, multi plana facie, multi quadrata, multi in camerae [“vault”] modum, scilicet ut sub terra non sit similis ac supra caput est mundi facies.” This is a comment on *De inv.* I 8, “*quae sit mundi forma*” (see *supra*, n. 61), i.e. an illustration of a θέσις in physics. On this commentary (alternative title: *Commentum*, or *Commenta*) by Victorinus on Cicero’s *De inventione* (which in antiquity was also known as Cicero’s *Rhetorica* or *Libri rhetorici*) see P. Hadot, *Marius Victorinus: Recherches sur sa vie et ses œuvres*, Paris: Études Augustiniennes 1971, 72 ff.; for the passage I have cited *ibid.*, 79 f. For Victorinus’ remarks on the θέσις in general see *In Cic. Rhet.* 176.9 ff. and 270.4 ff. He seems to know what doxography is about, see *In Cic. Rhet.* 235.27 ff. (where he explains what he calls the “*probabile argumentum*”): “*Ergo ... ex his, qui in opinione sunt posita, probabile colligitur argumentum, si dicas inferos esse vel non esse, deos esse vel non esse* [cf. Aët. I 7], *mundum natum, mundum non esse natum* [cf. Aët. II 4]. *Istae opiniones δόγματα dicuntur, δοκῶ enim graece opinor et δόγμα opinio nuncupatur. Adeo manifestum est omnia, quae in mundo aguntur, argumentis probabilibus persuaderi, quando etiam philosophorum professionibus ex opinione nomen impositum est, ut δόγματα dicantur*”. Hadot, *op. cit.* 47 ff., calls this “le scepticisme de Victorinus”, which is not entirely correct.

quite correctly but ascribed to “Philolaus the Pythagorean”¹⁵⁶—a name Aristotle had not mentioned. As we have noticed, the doctrine of the counter-earth here ascribed to Philolaus (cf. also II 7.7) is ascribed to Hicetas at III 9.2.¹⁵⁷ The theory of Hicetas at 9.2 is therefore the same as that of Philolaus at 11.3, and we may presumably infer that these two individuals represent the Pythagoreans in general (for Philolaus see also below, on III 13.2).

I skip III 12, on the inclination of the earth, to which nothing at *Cael.* B 13 corresponds, and continue with III 13. In ps.-Plutarch, the title is *περὶ κινήσεως γῆς*; in Stobaeus, it is formulated more appropriately as a question concerned with an attribute, viz. *πότερα μένει ἢ γῆ ἢ κινεῖται*. This corresponds exactly with a problem which, as we have seen, was explicitly addressed by Aristotle. The diaeresis is also the same as in Aristotle, viz. between those who say the earth is at rest and those who say it moves. At 13.1, we read that “the others” say the earth is at rest (according to Aristotle, this is the view of the majority). At 13.2, we have the opposite view, viz. the view Aristotle ascribes to the Pythagoreans in general and ps.-Plutarch to Philolaus; it is the theory already described at 11.3. At 13.3, a further view is added which is ascribed to “Heraclides of Pontus and Ecphantus the Pythagorean”. As to its contents and its position in relation to what, in Aristotle, is the general Pythagorean theory and in ps.-Plutarch that of Philolaus, this tenet corresponds with the view ascribed by Aristotle at *Cael.* B 13. 293b30 ff. to Plato and to others who are left unidentified; as to its contents, it corresponds with that ascribed by Cicero (on Theophrastus’ authority) at *Ac. pr.* II 123 to Hicetas and Plato. But the way this view is expressed in ps.-Plutarch is different. He emphasizes the opposition

As to the geometrical shapes other than the sphere mentioned in some of these passages, viz. the cube (Cleomedes, Victorinus) and the pyramid (Cleomedes), one may perhaps think of Plat. *Tim.* 55c-d (see also *supra*, n. 88), where the baffling suggestion that there may be five cosmoi is linked to the existence of the five regular solids, among which the pyramid and the cube (which is also the elemental particle of earth!). In the doxographies, these shapes may have been transferred to the earth *per analogiam* for the reason mentioned above. As to the analogy involved, we may also note that the question whether the earth is *μία καὶ πεπερασμένη* (Aët. III 9) is the same as that concerned with the number and extension of the universe(s).

¹⁵⁶ The cosmic system attributed to Philolaus is described at considerable length at II 7.7 (Stobaeus only); note that here he is not called “the Pythagorean”.

¹⁵⁷ At III 11.3, ps.-Plutarch explains (just as Aristotle had done) why we on the inhabited earth are not aware of the counter-earth, but adds that also the counter-earth is inhabited. Presumably, this information caused 11.4, on Parmenides’ discovery that the earth has several inhabited (and so several uninhabitable) zones, to be appended here, for this item would have been more appropriately located in the now incomplete chapter III 14 which I do not discuss because it has no counterpart at *Cael.* B 13. Note, however, that at *Met.* B 5.362a32 ff. Aristotle argues that there are two habitable sectors of the earth’s surface (see *supra*, n. 124). The parallels at Achilles *Isag.* ch. 29 have not been noticed.

between his Philolaus and his Heraclides-cum-Ecphantus by stating that these “move the earth, but not from one place to the other but by revolution,¹⁵⁸ fitted to an axis (ἐνῆξονισμένην¹⁵⁹) in the manner of a wheel, from west to east about its own centre”. But he does not mention Plato. Whether or not Heraclides shared (a version of) Plato’s view is immaterial.¹⁶⁰ What matters is the wonderful parallel, as to the contents and relative position of the tenets that are cited, between Aristotle, Cicero, and ps.-Plutarch, and what also matters is that Cicero (who says Theophrastus said so) mentions the obscure Hicetas and ps.-Plutarch the equally obscure Ecphantus. Ecphantus seems to represent a deviant Pythagorean view, whereas Hicetas at III 9.2 apparently represents a standard Pythagorean view also represented by Philolaus at III 11.3,¹⁶¹ and Heraclides seems to have ousted Aristotle’s Plato (although Plato may have been simply left out by ps.-Plutarch, who rather often omits name-labels from a series). Finally, we should note that ps.-Plutarch’s Ecphantus puts the earth at the centre, just like Cicero’s Hicetas.¹⁶²

The conclusion that Cicero and ps.-Plutarch/Aëtius derive from versions of the same tradition that were very close is inescapable; the further assumption that this tradition is ultimately indebted to *Cael.* B 13 is equally inescapable. We should welcome Cicero’s reference to Theophrastus, who therefore may be assumed to have been an intermediary source between Aristotle on the one hand and Cicero and Aëtius on the other. But we must posit several further intermediaries between Theophrastus and the tradition (or the members of the family belonging to this tradition) on which both Cicero and Aëtius depend.

In the sources discussed above, the tenets attributed to Philolaus, Ecphantus and Hicetas occur as elements in *diaphoniae*. This function alone may already imply distortion. Furthermore, the data concerning Philolaus, Ecphantus and Hicetas provided by the doxographies cannot be reconciled with one another; once again, it follows that the tenets are more important than the name-labels. This should make one wary as to speculating about what Philolaus, and especially Ecphantus and Hicetas, may really have believed. But this is by the way.

¹⁵⁸ οὐ μεταβατικῶς ἀλλὰ τροπικῶς. But note that the *varia lectio* τροπικῶς seems to be supported by the Arabic version.

¹⁵⁹ Cf. Cicero’s “*circum axem*” and Aristotle’s περὶ τὸν ... πόλον.

¹⁶⁰ Gottschalk, *op. cit.* (*supra*, n. 145), 58 ff., affirms that the “most definite” information is at Aët. III 13.3 (*ibid.*, 58).

¹⁶¹ These three individuals are each time identified by ps.-Plutarch as ὁ Πυθαγόρειος. See further Burkert, *op. cit.* (*supra*, n. 143), 243 ff., on the attribution to Philolaus in parts of the later literature of doctrines ascribed by Aristotle to the Pythagoreans in general.

¹⁶² *Ad finem* (13.4) ps.-Plutarch adds a tenet ascribed to Democritus which is a compromise view. Democritus has it both ways. In the beginning, the earth moved around because it was small and not heavy, but as it got denser and heavier it finally came to a halt. We may notice that this explanation involves the question of the *genesis* and οὐσία of the earth (cf. *supra*, p. 103 f., on III 9.4-5).

Finally, we may observe that at III 15, on earthquakes, several lemmata are concerned with the reason why the earth is (normally) at rest, and that the tenets involved correspond to tenets discussed at *Cael.* B 13. For III 15.8,¹⁶³ Ἀναξιμένης διὰ τὸ πλάτος ἐποχεῖσθαι τῷ ἀέρι, compare 293b32, 294a9-10, and especially 294b13-15, Ἀναξιμένης ... τὸ πλάτος αἴτιον ... , ἐπιπωμάζειν τὸν ἀέρα For III 15.9, οἱ δὲ φασιν ἐφ' ὕδατος just as pieces of wood, compare 294a28, οἱ δ' ἐφ' ὕδατος κείσθαι and the explanation that follows. The versions of the equilibrium doctrine which Aristotle at 295b11 ff. attributes to Anaximander and others are ascribed at III 15.7 and 10 to Parmenides, Democritus, and Plato.¹⁶⁴

VIII. DIALECTIC IN AËTIUS AND THEOPHRASTUS

I have suggested above¹⁶⁵ that Theophrastus' *Φυσικαὶ δόξαι* contained counter-arguments to the various tenets of the experts. In Aëtius, most traces of such arguments *contra* have disappeared; it is therefore all the more important that a few survive, and that one of these can be proved to derive from the great treatise.¹⁶⁶

In Aët. I 2, Thales is criticized: ἀμαρτάνει οὖν ὁ Θαλῆς, and an objection formulated. In I 3, both Anaximander and Anaximenes are criticized and objections are again formulated: 3.3 ἀμαρτάνει, scil., Anaximander (twice in ps.-Plutarch, once in Stobaeus); 3.4, ἀμαρτάνει δὲ καὶ οὗτος,¹⁶⁷ i.e. Anaximenes. The first objection against Anaximander, interestingly enough, uses one of the question-types as ammunition: Anaximander did not say what his principle is (ἀμαρτάνει δὲ οὗτος μὴ λέγων τί ἐστὶ τὸ ἄπειρον, πότερον ἄηρ ἐστὶν ἢ ὕδωρ

¹⁶³ Note that Diels has modified the sequence transmitted by ps.-Plutarch; I quote the order of his reconstructed Aëtius.

¹⁶⁴ Further discussion of Aët. III 15 must be postponed to another occasion.

¹⁶⁵ *Supra*, § I. One may also adduce Alex. of Aphrodisias on the usefulness of dialectic πρὸς γυμνασίαν, *In Top.* p. 27.17-8, καὶ ἐστὶ δὲ βιβλία τοιαῦτα Ἀριστοτέλους καὶ Θεοφράστου γεγραμμένα ἔχοντα τὴν εἰς τὰ ἀντικείμενα δι' ἐνδόξων ["from reputable premises"] ἐπιχείρησιν. Reputable premises are what a dialectical discussion according to the Aristotelian *Topics* is about (already according the very first sentence, A 1.100a20). Unfortunately, Alexander is not more specific, but his description fits what I take to be the contents of the *Φυσικαὶ δόξαι*. Also compare Theon, *Progymn.* ap. Spengel *Rhet. graec.* II, 69.1 ff., on the many works by Aristotle and Theophrastus with the word *theseis* in their title.

¹⁶⁶ Diels, *DG* 180 f., discusses some of these passages, but his overview is incomplete and he has missed the parallel between Aët. I 5.3 and Theophr. *Phys. op.* fr. 11. He believes the criticisms have been interpolated by Aëtius and that the critique of others is "*contra morem*" [scil., *Placitorum*]. *Quod non*.

¹⁶⁷ Stobaeus omits καὶ οὗτος because he inserts Xenocrates and Xenophanes between Anaximander and Anaximenes.

ἢ γῆ ἢ ἄλλα τινὰ σώματα). At *Phys. op.* fr. 2 (from the *Physics*¹⁶⁸), this criticism is not found;¹⁶⁹ here Theophrastus merely says that Anaximander did not say his principle is water or any other element but said it was something else, viz. a φύσιν ἄπειρον. Although the argument *contra* in Aëtius is clearly indebted to this description of the ἄπειρον as something different from the standard four elements, it goes further in that it turns a report—cf. esp. *DG* 476.11-3—into a criticism which hinges on the question concerned with substance. One may argue that in *Phys. op.* fr. 2 this criticism is implicit and that it may have been formulated explicitly by Theophrastus in another context. The obvious candidate for this context is the lost passage in the *Φυσικαὶ δόξαι* treating the same issue.

In I 5, a series of arguments *ad hominem* against Plato survive (5.3, πρὸς δὴ τὸν Πλάτωνα ῥητέον¹⁷⁰ κτλ.). The last of these is that the cosmos cannot be imperishable because it has come into being. Precisely the same objection was formulated by Theophrastus against Plato in the *Φυσικαὶ δόξαι* (*Phys. op.* fr. 11):¹⁷¹ “Theophrastus however in his *On the Physical Tenets* argues against Plato that the cosmos has come into being and formulates his objections (ἐνστάσεις) accordingly”. We have already noted that—*mirabile dictu*—this is the only text which preserves the title,¹⁷² and shall see that it is also the only text which is explicit about Theophrastus’ method. His critique of course echoes what Aristotle says at *Cael.* A 10.

In I 7, an objection against both Anaxagoras and Plato is formulated: 7.7, κοινῶς οὖν ἀμαρτάνουσιν ἀμφότεροι, i.e. Anaxagoras and Plato, in that both make the divine intellect, or the god, responsible for the ordering of things. The objection at I 7.7 states the Epicurean argument (not against Plato and Anaxagoras but) against the Stoics: what is blessed and immortal does not bother about men and about creating a world for men. This means that in order to state contrasting views one could appeal to the-Epicureans-against-the-Stoics against Plato!

In IV 19.3, an objection against Democritus is introduced with the formula ἔχου δ’ ἂν τις πρὸς τούτους εἰπεῖν.

The method of stating objections is attested for Theophrastus’ *Φυσικαὶ δόξαι* by Taurus *ap. Philop. Adv. Proclum* VI 8.27 (= *Phys. op.* fr. 11, 1st text): καὶ Θεόφραστος μέντοι ἐν τῷ Περὶ τῶν φυσικῶν δοξῶν κατὰ Πλάτωνα φησι γενητὸν τὸν κόσμον καὶ οὕτω ποιεῖται τὰς ἐνστάσεις (translated above). The technical term ἐνστάσις is familiar from Aristotle’s *Topics*. Again and again in the course of this work, Aristotle formulates what he calls an ἐνστάσις against a particular view or argument that is being cited or put forward, and in *Top.* Θ 2 one finds a substantial discussion of this technique of refutation. We have

¹⁶⁸ See *supra*, n. 7.

¹⁶⁹ Diels, *DG* 180, surprisingly says it is.

¹⁷⁰ Cf. e.g. Arist. *Cael.* B 13.295a29-30, πρὸς Ἐμπεδοκλέα κἂν ἐκεῖνό τις εἴπειεν.

¹⁷¹ See *infra* for the Greek text.

¹⁷² See *supra*, p. 64 f.

noticed above¹⁷³ that at *Cael.* B 13 Aristotle points out that if one wishes to proceed correctly one has to be ἐνστατικὸν ... διὰ τῶν οἰκείων ἐνστάσεων τῷ γένει.

No fragments of the *Φυσικαὶ δόξαι* survive which attest the use by Theophrastus, in this work, of the kinds of inquiry and the types of question which impart structure to a discussion. We must make do with some instances chosen at random from the other remnants of his writings. His fragment *On Winds* (fr. 5 Wimmer) begins with the sentence ἡ τῶν ἀνέμων φύσις¹⁷⁴ ἐκ τίνων μὲν καὶ πῶς καὶ διὰ τίνας αἰτίας γίνεται τεθεώρηται πρότερον. The *Metaphysics* begins with the formula πῶς ἀφορίσαι δεῖ καὶ ποίοις τὴν ὑπὲρ τῶν πρώτων θεωρίαν. Cf. also the beginning of the *On Fatigue* (fr. 7 Wi.): ἐν τίνι ποθ' ὁ κόπος (ῆ) τίσιν ὡς πρώτῳ κτλ. The *De causis plantarum* begins as follows (note the explicit reference to the diaeresis that is necessary): τῶν φυτῶν αἱ γενέσεις ὅτι μὲν εἰσι πλείους καὶ πόσαι καὶ τίνες ἐν ταῖς ἱστορίαις εἴρηται πρότερον. ἐπεὶ δ' οὐ πᾶσαι πᾶσιν, οἰκείως ἔχει διελεῖν τίνες ἐκάστοις καὶ διὰ ποίας αἰτίας, ἀρχαῖς χρωμένους ταῖς κατὰ τὰς ἰδίας οὐσίας. Each time, I have italicized the words which indicate a specific issue, viz. one concerned with substance, or quantity, or place, or cause, etc. We may safely hypothesize that Theophrastus in the *Φυσικαὶ δόξαι* proceeded in the same way*.

¹⁷³ *Supra*, p. 97.

¹⁷⁴ I.e., οὐσία.

* I wish to thank Keimpe Algra, Han Baltussen, Teun Tieleman, and especially David Runia for valuable critical comments on earlier versions of this paper. Several parallels quoted in the footnotes I also owe to David Runia.

Xenophanes or Theophrastus? An Aëtian *Doxographicum* on the Sun

David T. Runia

- I. The problem
- II. The significance of the problem
- III. Arguments for Theophrastus as both author and source
- IV. Arguments for Xenophanes as author and Theophrastus as source
- V. Provisional conclusion
- VI. Further analysis of the doxographical context
- VII. Concluding remark

I. THE PROBLEM

The problem that this paper wishes to address is raised by the juxtaposition and comparison of two doxographical texts, both of which deal with the question of the nature or substance of the sun:

- (i) Ps.-Plutarch, *Placita philosophorum* 2.20, 90.10-19 Mau
κ' Περί ουσίας ἡλίου καὶ ὅτι δύο καὶ τρεῖς εἰσὶν
Ἀναξίμανδρος κύκλον εἶναι ὀκτωκαιεικοσαπλασίονα τῆς γῆς ...
Ξενοφάνης ἐκ πυριδίων τῶν συναθροιζομένων μὲν ἐκ τῆς ὑγρᾶς ἀναθυμιάσεως συναθροιζόντων δὲ τὸν ἥλιον· ἡ νέφος πεπυρωμένον (v.l. ap. Euseb. ἐκ νέφων πεπυρωμένων).
Οἱ Στωικοὶ ἀναμμα νοερὸν ἐκ θαλάττης ...
- (ii) Johannes Stobaeus, *Eclogae Physicae* 1.25.1, 207.12-208.6 Wachsmuth
Περὶ ουσίας ἡλίου καὶ μεγέθους σχήματός τε καὶ τροπῶν καὶ ἐκλείψεως καὶ σημείων καὶ κινήσεως
Ξενοφάνης ἐκ νέφων πεπυρωμένων εἶναι τὸν ἥλιον.—ἔκλειψιν δὲ γίνεσθαι κατὰ σβέσιν· ἕτερον δὲ πάλιν ταῖς ἀνατολαῖς γίνεσθαι. παριστόρηκε δὲ καὶ ἔκλειψιν ἡλίου ἐφ' ὅλον μῆνα καὶ πάλιν ἐντελῇ, ὥστε τὴν ἡμέραν νύκτα φανῆναι.

Θεόφραστος ἐν τοῖς Φυσικοῖς γέγραπεν, ἐκ πυριδίων μὲν τῶν συναθροιζομένων μὲν (ἐκ) τῆς ὑγρᾶς ἀναθυμιάσεως συναθροιζόντων δὲ τὸν ἥλιον. Ἀναξιμανδρος κύκλον εἶναι ὀκτώκαιεικοσαπλασίονα τῆς γῆς ...

The verbal parallels between these two texts are too close to be coincidental. It has long been recognized that they both derive from an anterior source, which—through a fortunate piece of information provided by the Church father Theodoret—can be securely identified as the *Περὶ ἀρεσκόντων συναγωγή* of an otherwise unknown author Aëtius. In about the 1st or 2nd century A.D. this author collected and arranged an extensive collection of philosophical placita, which he in large part derived from a previous doxographical source (traces of which, as we shall see, are probably to be found in the *Εἰσαγωγή* to the *Phaenomena* of Aratus by Achilles). Since Aëtius' book is otherwise lost, its contents and arrangement have to be reconstructed from later authors—primarily Ps.-Plutarch and Stobaeus, but also others such as Theodoret, Eusebius, Ps.-Galen, Qusṭā Ibn Lūqā, who use it either directly or indirectly.

The problem I wish to consider is in the first instance raised by the second, Stobaeus text. Does the doxa in the second lemma belong to Theophrastus, who is giving his own view on the οὐσία of the sun, or is the Eresian reporting the view of Xenophanes, as is implied by the text of the second lemma in Ps.-Plutarch? This problem in turn raises a subsidiary question which will be of concern to those interested in the way our doxographical sources work. If the two texts are directly derived from the same anterior source, how can the significant discrepancies between them be explained?

My strategy in this paper will be first to present some arguments in favour of the first position, i.e. that the doxa is Theophrastean, followed by arguments that support the opposite thesis, i.e. that the doxa is Theophrastus reporting on Xenophanes. It will emerge, however, that in order to present a fully satisfying answer to the problem, it will be necessary to examine more carefully the way that these doxographical texts work. First, however, it will be worth taking a closer look at why the problem deserves to be studied at all.

II. THE SIGNIFICANCE OF THE PROBLEM

What other starting-point can we take than the *Doxographi Graeci* of Hermann Diels?¹ This book—completed when Diels was only 31 years of age—, together with his later *Die Fragmente der Vorsokratiker* (VS), have exercised an immeasurable influence on the study of ancient philosophy, an influence which is all the greater because it is generally not recognized. It was Diels who coined

¹ Berlin 1879, frequently reprinted but never altered (henceforth DG).

the term 'doxography' and undertook the reconstruction of the Placita of Aëtius.² At DG 348-9, therefore, we come across our two passages in the familiar double columns of Diels' text, which constitute a kind of compromise between an edition of Ps.-Plutarch and Stobaeus and a reconstruction of the original Placita of Aëtius.

AETII PLAC. II 20 1-4

PLUTARCH EPIT. II.20

κ'. Περὶ οὐσίας ἡλίου. G62
E XV 26 1-7

Ἀναξίμανδρος κύκλον εἶναι ὁκ-
τωκαιεικοσαπλασίονα τῆς γῆς ...

10 Ξενοφάνης ἐκ πυριδίων τῶν
συναθροισμένων μὲν ἐκ τῆς ὑγρᾶς
ἀναθυμιάσεως συναθροιζόντων δὲ
τὸν ἥλιον· ἢ νέφος πεπυρωμένον.

|| 10 τῶν φαινομένων συναθροισ-
μένων E cf. Prol. p.8 || 13 ἢ om. E ||
ἐκ νέφων πεπυρωμένων E cf. Achill.:
νέφος πεπυρωμένον (A)BC

STOBAEI ECL. I 25 1

Περὶ οὐσίας ἡλίου.

1 Ἀναξίμανδρος κύκλον εἶναι ὁκ-
τωκαιεικοσαπλασίονα τῆς γῆς ...

2 Ἀναξιμένης πύρινον ὑπάρχειν τὸν
ἥλιον ἀπεφήνατο.

3 Ξενοφάνης ἐκ νέφων πεπυρωμένων
εἶναι τὸν ἥλιον.

**Θεόφραστος ἐν τοῖς Φυσικοῖς γέ-
γραφεν ἐκ πυριδίων μὲν τῶν συν-
αθροισμένων (ἐκ) τῆς ὑγρᾶς ἀναθυ-
μιάσεως συναθροιζόντων δὲ τὸν
ἥλιον·

14 Theophrasti nomen, cuius de Xeno-
phane sententiam addiderat Aëtius, ab illo
inepte seiunxit Stobaeus. intercidisse ἢ ὡς
coniecit Usener ad Theophr. fr. 16 cf. Prol.
p.140.217.220||16 ἐκ om A: restitutum ex
Plut.

[SIGLA: G Ps.-Galen, *Philosophia Historia*; E Eusebius, *Praeparatio Evangelica*; A
codex Mosquensis 339; B codex Marcianus 521; C codex Parisinus 1672]

In order to reconstruct the original text of Aëtius Diels is constrained to make a decision on what has happened in his sources. His choice is to retain the order of Ps.-Plutarch, i.e. that Aëtius begins with Anaximander. In the apparatus he

² I have summarized the reasoning and procedure of Diels in my article "Xenophanes on the Moon: a *Doxographicum* in Aëtius", *Phronesis* 34 (1989) 245-69, which may be regarded as a companion piece to this article (both articles are preparatory studies for a monograph on Aëtius being prepared by J. Mansfeld and myself). See esp. 248-50 (with a chronological diagram). Diels himself did not discover the Aëtius hypothesis, but his reconstruction has become canonical. References to Aëtius are almost always given in terms of Diels' reconstruction, a bad habit, but one that has become completely ingrained (see further n.29).

explicitly states that Aëtius had added the report of Theophrastus, but that Stobaeus had incompetently separated his name from the lemma to which it belonged. The further references to Usener and the Prolegomena to the DG are important. It had been Usener, Diels' teacher in Bonn, who had first started research on the doxographical tradition. Not only had he postulated the crucial role played by Theophrastus in this tradition, but he had also made an edition of the fragments of Φυσικῶν δόξαι, which he believed to have been the *Urquelle* for the entire tradition. Fr. 16 in Usener's edition reads:³

Ξενοφάνης ἐκ νέφων πεπυρωμένων εἶναι τὸν ἥλιον . . . ἢ ὡς Θεόφραστος ἐν τοῖς Φυσικοῖς γέγραπεν, ἐκ πυριδίων τῶν συναθροιζομένων μὲν ἐκ τῆς ὑγρᾶς ἀναθυμιάσεως συναθροιζόντων δὲ τὸν ἥλιον.

Diels' edition of the same work follows Usener slavishly.⁴ The fragment has the same number and the text is the same, except that Diels deletes the conjectured words ἢ ὡς, his view being that Stobaeus has presented the Theophrastean lemma as a new doxa.⁵ The same view would appear to be implied by the double asterisk in the reconstruction of Aëtius. Diels does not even contemplate the possibility that Stobaeus might have been recording an original doxa of Theophrastus himself. It is, in fact, striking how little idea the reader gets in the DG of what has actually happened in the sources. There is no way of telling, for example, that in Stobaeus the chapter *begins* with the doxa of Xenophanes.

In his Prolegomena to the DG Diels develops the theory of the Peripatetic and, in particular, Theophrastean origin of the doxographical tradition in a long sustained argument of such astounding erudition and recondite complexity that the reader suspects at times that the aim is more to impress than to inform. Our text is exploited three times. In 133-44 Diels gives a conspectus in five columns of four later doxographical authors (Hippolytus, Ps.-Plutarch *Stromateis*, Diogenes Laertius, Aëtius) and the fragments of Theophrastus' Φυσικῶν δόξαι (as he thinks). Our text is one of only two which have the privilege of straddling two columns, i.e. those of Aëtius and Theophrastus (138, 140). (The other text is Aëtius *ap. Stob.* 1.26.3, a doxa on the eclipse of the moon: 'Αναξαγόρας, ὡς φησι Θεόφραστος, καὶ τῶν ὑποκάτω τῆς σελήνης ἔσθ' ὅτε σωμάτων ἐπιπροσθοῦντων (= Φυσικῶν

³ *Analecta Theophrastea* (diss. Leipzig 1858) 41; repr. in *Kleine Schriften* (Berlin 1912) 1.84.

⁴ The fragments in DG 475-95 retain the same numbering as in Usener, except that Diels deals with the fragments of the Epitome and the dubious fragments differently; cf. DG 495.

⁵ Cf. the note *ad loc.* in Wachsmuth's edition of S (1.207): "addito ἢ ὡς Usener olim volebat, Theophrasti de Xenophane testimonium tamquam nova opinio affertur." Wachsmuth leans heavily on Diels' analysis in his text of Book I of S's Eclogae, while in the preface to DG Diels thanks Wachsmuth effusively for the assistance he gained from him. Diels' Aëtius and Wachsmuth's Stobaeus are thus mutually 'contaminated'.

δόξαι, fr. 19 Diels).⁶ These two passages are thus first-class evidence for the theory that the nucleus of the material in the doxographical tradition on the Presocratics goes back to the authoritative (if not entirely unimpeachable) evidence of Theophrastus. The claim is further supported by the fact that similar material is found in two other columns, Hippolytus and Ps.-Plutarch *Stromateis* (Diogenes' doxography is in this case too brief).

Nevertheless Diels does show an awareness that these passages have their difficulties. It is possible, for example, that Aëtius used Theophrastus directly and did not receive his material via the tradition, for in both cases two doxai are attributed to the philosophers involved and the Theophrastean reference is only given in order to authorize an alternative view (DG 217).⁷ He goes on to argue that Theophrastean material entered the tradition at different times and in various ways. It is probable that the compiler of the original *Placita*, which Diels takes to have been Aëtius' source (i.e. the so-called *Vetusta Placita*, dated to the early 1st century B.C.), had access to Theophrastus' work. Our text with its two doxai placed side by side is fine evidence. The one doxa which has Theophrastus' name attached to it shows unmistakable Theophrastean touches.⁸ The other doxa is phrased in much more general terms. The doxographer will also have been drawn from the material available to him—for later compilers were not acquainted with Xenophanes' actual poem—, but by this time it will have gone through various hands (DG 220).

There is, however, one very serious problem raised by all this ingenious *Quellenforschung*. Our text does not speak of the Φυσικῶν δόξαι at all, but gives the reference as ἐν τοῖς Φυσικοῖς.⁹ Blinded by loyalty to Usener's hypothesis, Diels never gives a satisfactory explanation as to why the discrepancy in the title should have occurred.¹⁰

Finally we should cast a brief glance at Diels' other authoritative study. Much of his VS is based on the analyses in the DG. It is thus rather surprising to discover the following note to the citation of the text at 21A40:¹¹

Aëtios gab zuerst ein Excerpt aus Poseidonios, der Theophrast benutzt, dann aus Theophrast selbst. Vgl. Diels *Berl. Sitz. Ber.* 1920, 2ff.

⁶ Remarkably the entire fragment was accidentally omitted from Usener's collection; cf. DG 493n.

⁷ The entire paragraph commencing with "hinc erit fortasse quispiam ..." is a fine example of how frustratingly convoluted and obscure Diels' argumentation can be.

⁸ More on this shortly; cf. below at n.39.

⁹ I leave aside the problem of the title of Theophrastus' work. As Mansfeld has shown (in the paper immediately preceding this one), the title is more likely to have been Φυσικαὶ δόξαι.

¹⁰ Cf. DG 102.

¹¹ I quote from the eleventh edition (1.124). The first sentence of the note was not printed in the unannotated first edition (1903), but is already present in the third edition (1912). The further reference to the 1920 paper was added by Kranz in the fifth edition (1934).

This note is genuinely puzzling. Why should Diels now think that the first doxa, phrased in very general and bald terms, should be an excerpt from Posidonius? A solution might be that after the publication of DG Diels became more and more convinced that the origin of the *Vetusta Placita* was to be found in the circle around the figure of Posidonius, even going so far as to call them "Posidonianische Ἀρέσκοντα (d. h. ... Sammlung eines Posidonianers)".¹² The reference to the late study on Lucretius and his sources furnishes no further information.¹³ Diels evidently adheres to his conviction that this lemma shows how Theophrastean material entered the doxographical tradition in different ways, but phrases it here in terms that are less precise than in his earlier publications.¹⁴

Diels' views remained unchallenged for some two generations, until they were energetically attacked by Steinmetz in his study on Theophrastus' physics. In an Appendix Steinmetz furnishes powerful arguments to show that Usener and Diels' reconstruction of the Φυσικῶν δόξαι—he accepts their title—is defective.¹⁵ The titles in the sources should be taken seriously. In fact only a single fragment (no. 11, Taurus as reported by Philoponus) actually records the title in the form Περὶ τῶν φυσικῶν δοξῶν.¹⁶ Most of the fragments, including the most important ones on the ἀρχαί in Simplicius, are derived from Theophrastus' *Physics*. This is not to say that Theophrastus did not collect doxographical material. Steinmetz retains the view that the aim in the Φυσικῶν δόξαι was to interpret and evaluate the philosophical systems of the Presocratics in such a way as to make them accessible to a larger circle of readers.¹⁷ But he himself later used this material in his own systematic works, commencing his discussions with surveys of existing views on the subject, just as his teacher Aristotle had done.¹⁸

But with regard to our passage in Aëtius Steinmetz proceeds to establish a more radical view. Arguing for the thesis that Theophrastus abandoned the Aristotelian theory of the fifth etherial element, he affirms that the view that the sun's fire

¹² "Über das physikalische System des Straton", *Sitz. Ber. Akad. Berlin* 27 (1893) 102, = *Kleine Schriften zur Geschichte der antiken Philosophie* (Darmstadt 1969) 240.

¹³ "Lukrezstudien II und III", reprinted in *Kleine Schriften* 340-356; see esp. n.2 on 342. The argument appears to be that the polemic against Epicurus at Cleomedes 2.1 158-62 Ziegler is derived from Posidonius, as confirmed by Strabo 3.1.5, where the phenomena of sunset and sunrise are discussed. But nowhere is there any indication that the views of Xenophanes were reported. I. Kidd, *Posidonius: II. The Commentary* (Cambridge 1988) 463 is even sceptical about the anti-Epicurean intent.

¹⁴ Diels tends to be less precise (but just as apodictic) in his later references to the doxographical tradition. The intended revised edition was never published.

¹⁵ P. Steinmetz, *Die Physik des Theophrastos von Eresos*, Palingenesia 1 (Bad Homburg 1964) 334-351 (henceforth PT). The pertinent criticisms of the arguments by H. B. Gottschalk, *Gnomon* 39 (1967) 19-20 do not detract from their importance and general validity.

¹⁶ No. 11, Taurus as reported by Philoponus; an epitome of the work is mentioned in fr. 5a.

¹⁷ PT 337, 350; cf. Usener *op. cit.* (n.3) 26-7, Diels DG 102ff.

¹⁸ PT 350f.

is sustained by its drawing up the moist exhalation is explicitly attributed to Theophrastus in the ancient doxographical tradition, namely in the text of Stobaeus. In Ps.-Plutarch this view is attributed to Xenophanes, but Diels was wrong to prefer this text to the explicit statement of Stobaeus. The reason that scholars refused to accredit the Eresian with this view was that they regarded him as a slavish follower of his master Aristotle, without any independent ideas. The doxa belongs not to a doxographical work, but represents his own view as expressed in his *Physics*.¹⁹

In very recent times the question has again been a topic of discussion. In an article examining various aspects of Theophrastus' cosmological ideas, Sharples has sided with Diels against Steinmetz.²⁰ On our particular text he asserts that "Steinmetz' arguments for interpreting what Stobaeus attributes to Theophrastus as Theophrastus' own opinion do not seem very convincing".²¹ Steinmetz' view, however, has received support from Mansfeld, who in a long article presents an exhaustive analysis of the doxographical traditions that report Xenophanes' views on theology and ontology.²² The fragility and flimsiness of the seemingly solid body of evidence in Diels' famous conspectus is convincingly demonstrated. With regard to our passage, i.e. the single text of Xenophanes that straddles two columns, Mansfeld asserts that the argument of Steinmetz has to be accepted, i.e. that "the Theophrastus fragment at Stob. I 25.3 is from his *Physics*, i.e. not from the doxographical work, and gives us Theophrastus' own view, not Xenophanes".²³ As such this gives important support to his case that "the vulgate accounts of Xenophanes' physical system do not derive from Theophrastus, although it cannot be excluded a priori that single bits and pieces of what one may perhaps call his physical theory do have a Peripatetic provenance."²⁴

The upshot of all this is clear. *Either* our fragment tells us something important about Theophrastus' physical theories *or* it furnishes valuable information about his doxographical activity. It will be interesting to see how the verdict should fall. Let us move on to the arguments.

III. ARGUMENTS FOR THEOPHRASTUS AS BOTH AUTHOR AND SOURCE

We shall commence with the arguments that can be mustered in favour of Theophrastus as not only source, but also author of the doxa in our text. This position can be defended from at least three different viewpoints.

¹⁹ PT 165f.

²⁰ R. W. Sharples, "Theophrastus on the Heavens", in J. Wiesner (ed.), *Aristoteles Werk und Wirkung*, Bd. 1 Aristoteles und seine Schule (Berlin 1985) 577-93 (henceforth TH).

²¹ TH 584.

²² J. Mansfeld, "Theophrastus and the Xenophanes doxography", *Mnemosyne* 40 (1987) 286-312 (henceforth TX).

²³ TX 293.

²⁴ TX 293-4.

(a) from the perspective of the source material

Both our main sources Ps.-Plutarch and Stobaeus make direct *verbatim* use of Aëtius, but in very different ways. What Ps.-Plutarch does is to compile an Epitome of the original work, reducing its bulk by about half.²⁵ Stobaeus, on the other hand, is an anthologist, whose aim is to copy out the available material in a pleasing and effective arrangement.²⁶ Not surprisingly the abbreviator retains a better picture of the overall structure, but the anthologist is more reliable when it comes to the preservation of individual lemmata.²⁷ Stobaeus' seemingly straightforward attribution of the doxa to Theophrastus is thus an argument in its favour.

Now, if the doxa is genuinely Theophrastean, then what Ps.-Plutarch has done is conflate two doxai together and present the whole as referring to Xenophanes. As Steinmetz points out,²⁸ there are a number of lemmata in Ps.-Plutarch which reveal how he conflates two separate doxai and attributes them to a single thinker or two thinkers taken together. The examples known to me are:²⁹

- 1.7.4 Democritus and Diogenes-Cleanthes-Oenopides conflated to Democritus;
- 1.9.4 Plato and Aristotle conflated to Aristotle-Plato;
- 1.11.3 Pythagoras and Aristotle conflated to Pythagoras-Aristotle;
- 1.18.5 Aristotle's report on the Pythagoreans conflated to Aristotle only;
- 1.20.1 The Stoics and Epicurus conflated to Stoics-Epicurus;
- 2.4.1 Pythagoras and the Stoics and Plato become Pythagoras-Plato-Stoics;³⁰
- 2.11.3 Aristotle and Parmenides and Anaximander conflated to Aristotle only (?);³¹
- 2.28.1 Anaximander-Xenophanes-Berosus and Aristotle conflated to Anaximander only;
- 3.3.5 Aristotle and Strato conflated to Aristotle;
- 4.13.2 Empedocles given doxa of the next lemma Hestiaeus.

The reason for the paucity of examples in the final three books is that we need

²⁵ According to the detailed analysis of *epitomai* still extant or reported in our sources, I. Opelt, art. 'Epitome' *RAC* 5 (1962) 958, concludes that the amount of reduction varied between 10% and 50% of the original. It is clear from the parallel tradition in Stobaeus that Ps.-Plutarch stayed closer to the latter.

²⁶ More on their respective techniques below in §6.

²⁷ Diels DG 63, cited by Steinmetz PT 166 n.1: "in excerpendi negotio Stobaeo negligentior et liberior est Plutarcheus."

²⁸ PT 165-6 and 166 n.1, based on Diels DG 64.

²⁹ References are to the edition of Ps.-Plutarch by Mau (Leipzig 1971), counting the individual lemmata in each chapter as sections. Note well that *as a matter of principle* I refuse to cite the numbering of Diels DG since he presents a reconstruction which is neither pure Aëtius (unknown) nor Ps.-Plutarch as presented in Mau's edition. What has happened in these texts, however, is most easily observed in Diels' double columns.

³⁰ Reconstruction of this chapter is extremely difficult. Diels' solution has simplified the real situation, as I will show in a complete reconstruction of Aëtius Book II to be published as part of the monograph mentioned above in n.2.

³¹ The defective text make it impossible to determine what originally stood in Ps.-Plutarch.

the evidence of Stobaeus in order to control what Ps.-Plutarch has done, but this evidence is largely lacking after 3.8. No doubt even more cases of conflation have occurred. It is easy to see how the careless abbreviator may have attributed to Xenophanes what was originally Theophrastean.

Nevertheless some caution is required here. One of the cases Diels gives of conflation is from the very same chapter on the sun, 2.20. Diels points out that the doxa attributed to Anaxagoras-Democritus-Metrodorus is spread out over three lemmata in Stobaeus.³² But the parallel section in Theodoret, who as we recall also used Aëtius, shows that it is Stobaeus who has split up and not Ps.-Plutarch who has conflated here. More importantly what has happened in our texts is not really a case of conflation parallel to the above. Ps.-Plutarch has not reduced two doxai to one, but has placed them side by side as alternatives connected by the word ἢ.³³ Moreover, as we noted at the beginning of the article, the order in Ps.-Plutarch is reversed, a fact which neither Diels nor Steinmetz comment on.³⁴

(b) from the perspective of Xenophanean cosmology

It might be argued, though Steinmetz does not do so, that the Theophrastean doxa does not agree with what we know about Xenophanes' cosmological theories. As is well known, Xenophanes attempted to explain various celestial and meteorological phenomena in terms of the theory that the heavenly bodies consisted of fiery or ignited clouds. The sun would appear to be the only exception, since it is apparently not only a fiery cloud, but also a συνάθροισμα of πυρίδια. *Prima facie* there would seem to be a difference between a cluster of 'firelets' and a cloud. Yet we should note that these firelets arise from the moist exhalation,³⁵ which is precisely the way one would describe the origin of a cloud. For this reason authorities on Presocratic cosmology such as Zeller, Kirk-Raven-Schofield, and Guthrie have no difficulty in reconciling the two accounts.³⁶

³² Ps.-Plutarch 2.20.5, Stobaeus 1.25.1e, 3a, 3h. But the association of Parmenides and Metrodorus in 1e is almost certainly a mistake on the part of Stobaeus, who mixed up a group of two (Anaximenes-Parmenides) with a group of three (Anaxagoras-Democritus-Metrodorus).

³³ To my knowledge this is a unique case. There are only a handful of doxai where Ps.-Plutarch gives an alternative (1.21.2 (Plato), 1.28.3 (Chrysippus), 4.2.1 (Thales)). But comparison with Stobaeus shows that these do not involve conflation.

³⁴ The order may also be reversed in 1.9.4, as suggested by the evidence in Theodoret, CAG 4.14. But we cannot be certain. Theodoret may have substituted the conventional chronological order.

³⁵ The moist exhalation of what? One is inclined to answer: of the ocean, especially in the light of the authentic fragment 21B30. But note the fascinating theory of Diels *art. cit.* (n.13)—ignored, as far as I know, by all subsequent commentators—that the theory, which is taken over in a non-dogmatic fashion by Epicurus and Lucretius, is based on empirical observation of the sunrise from Mount Ida.

³⁶ *Die griechische Philosophie in ihrer geschichtlichen Entwicklung dargestellt*

(c) from the perspective of Theophrastus' physics and cosmology

The Stobaeian doxa, if taken to be genuinely Theophrastean, does suit what we know about the Eresian's views on the nature of the heavens. This is Steinmetz's claim, based on a number of philosophical arguments.³⁷

(i) The radical division between supra- and sub-lunary world postulated in Aristotelian cosmology has been abandoned.

(ii) For Theophrastus the sun's heat is not an accidental product of friction but indicates its essence. The Aristotelian theory of the fifth etherial element requires at the very least modification, probably complete rejection.

(iii) According to the *De igne* heat and moisture are coupled.

(iv) If the sun consists of pure fire, then it must be burning itself up. Such a process would threaten the eternity of the cosmos, were its heat not somehow being replenished. This occurs through the process of cyclical ἀνταπόδοσις. The sun draws up replenishment of its heat from the moisture in the terrestrial realm.

It is this last doctrine that Steinmetz sees confirmed in the doxography presented in our text. To support its attribution to Theophrastus he adds two more philological arguments.

(v) In Stobaeus the Theophrastean doxa is at quite a distance from the earlier lemma on Xenophanes.

(vi) πυρίδιον is a typical Theophrastean word; one fails to see otherwise why the notion of νέφος, which was customary in the reportage of Xenophanes' views, was not used.³⁸

We will return to Steinmetz's philosophical arguments shortly. At this point, however, some brief comments can be made on the philological points which he brings forward. The latter of these is based on a footnote of Diels (DG 158 n.1, cf. 220 and n.2), which I fear Steinmetz has not fully understood.³⁹ Diels notes that the same word is used in the Ps.-Plutarchean *Stromateis* while reporting Xenophanes' views (a fact which, as we shall see, is fatal for Steinmetz's argument, but he fails to note it). The word cannot have been derived from the poem, since it is metrically impossible. The same applies to another diminutive νεφέλια, which occurs in Aëtius (cf. Ps.-Plutarch 2.18.1). This word in turn also occurs in other writings of both Theophrastus and Aristotle. The flimsiness of the argument here is exposed by the (now easily determined) fact that πυρίδιον occurs nowhere in the extant writings of Theophrastus.⁴⁰ Moreover it is obvious that the argument

(Leipzig 1921-237) 1.1.668; *The Presocratic Philosophers* (Cambridge 1983²) 173; *A History of Greek Philosophy* (Cambridge 1962-81) 1.391f.

³⁷ PT 158-67.

³⁸ I leave aside Steinmetz's attempt to improve the text, which seems to me unnecessary.

³⁹ Cf. also Sharples TH 584.

⁴⁰ Confirmed by a search of the data bank of the Thesaurus Linguae Graecae. The word is also not found in Bonitz's *Index Aristotelicus*.

cuts both ways. If the Eresian were reporting the doctrine of predecessors, he would tend to do it in his own terminology (this was in fact Diels' point). So it does not prove that he is presenting his own point of view.

The former of the philological arguments is true, but the fact only gains validity on the basis of a thorough examination of the procedure of Stobaeus the anthologist, which Steinmetz fails to supply.

IV. ARGUMENTS FOR XENOPHANES AS AUTHOR AND THEOPHRASTUS AS SOURCE

In the manner of an ancient θέσις with its *pro et contra dicere*, we now turn to the arguments which would appear to support the view that the author of the original doxa was Xenophanes, and that it was later reported by Theophrastus in one of his writings.

(a) from the perspective of the source material

When examining the doxographical background of the lemma, at least three issues need to be raised.

(i) If Xenophanes were the doxa's author, then Aëtius must be citing a source *expressis verbis*. Is it very likely that a doxographer would do this? In fact the evidence shows that Aëtius seldom quotes sources for his material, but does do it sometimes. A full list of the citations that are still extant is as follows (the chapter numbers based on Ps.-Plutarch):⁴¹

1. 1.7.1 τὸν δὲ Εὐήμερον καὶ Καλλίμαχος ὁ Κυρηναῖος αἰνίττεται ἐν τοῖς Ἰάμβοις γράφων (only in Ps.-Plutarch; this section not preserved in Stobaeus);
2. 1.18 Ὁ ἐπὶ τῶν Πυθαγορείων: Ἀριστοτέλης ἐν τετάρτῳ Φυσικῆς ἀκροάσεως γράφει (only in Stobaeus, = 1.18.1c);
3. 1.25 Λεύκιππος ... λέγει γὰρ ἐν τῷ Περὶ νοῦ (only in Stobaeus, = 1.4.7c);⁴²
4. 1.27 Ζήνων ὁ Στωικὸς ἐν τῷ Περὶ φύσεως (only in Stobaeus, = 1.5.15);
5. 1.28 Two versions: Ps.-Plutarch 1.28.3 Χρύσιππος ... καὶ πάλιν ἐν τοῖς Ὅροις; Stobaeus 1.5.15 Χρύσιππος ... τοῦτο μὲν οὖν ἐν τῷ δευτέρῳ Περὶ κόσμου, ἐν δὲ τῷ δευτέρῳ Περὶ ὄρων καὶ ἐν τοῖς Περὶ τῆς εἰμαρμένης καὶ ἐν ἄλλοις σποράδην πολυτρόπως ἀποφαίνεται λέγων;
6. 1.30.1 Ἐμπεδοκλῆς ... γράφει γὰρ οὕτως ἐν τῷ πρώτῳ Φυσικῶν (only in Ps.-Plutarch; this lemma not extant in Stobaeus);
7. 2.11 Ἀριστοτέλης ... λέγει γοῦν ἐν τοῖς Περὶ τῆς φυσικῆς ἀκροάσεως καὶ οὐρανοῦ λόγοις οὕτως (only in Stobaeus, = 1.23.2; perhaps interpolated by him as argued by Diels DG 216);
8. 2.19 Two versions: Ps.-Plutarch 2.19.3 Ἄρατος ... ἐν οἷς φησιν; Stobaeus 1.24.4

⁴¹ I have omitted references to poetic quotes where these are merely introduced by φησί *vel sim.*, e.g. at Ps.-Plutarch 1.3.10 (Empedocles).

⁴² It is possible that Stobaeus has split a lemma in two, and that the quotation should be ascribed to Democritus; cf. W. Burkert, *ICS* 2 (1977) 108 n.59.

- "Αρατος ... λέγει γοῦν "Αρατος ἐν τοῖς Φαινομένοις οὕτως (full reference probably supplied by Stobaeus);
9. 2.20 Θεόφραστος ἐν τοῖς Φυσικοῖς γέγραπεν, = our lemma (note reference excised in Ps.-Plutarch);
 10. 2.29 τῶν Πυθαγορείων τινὲς κατὰ τὴν Ἀριστοτέλειον ἱστορίαν καὶ τὴν Φιλίππου τοῦ Ὀπουντίου ἀπόφασιν (only in Stobaeus, = 1.26.3; clearly deleted by Ps.-Plutarch);
 11. 2.29 Ἀναξαγόρας, ὥς φησι Θεόφραστος, καὶ τῶν ὑποκάτω τῆς σελήνης ἔσθ' ὅτε σωμάτων ἐπιπροσθούντων (only in Stobaeus, = 1.26.3; again no specific reference);
 12. 3.4 Ξενοφάνης ... γράφει γάρ διαρρήδην (only in Stobaeus, = 1.31.4; note no specific reference)
 13. 3.17 Σέλευκος ὁ μαθηματικὸς ἀντιγεγραφὸς Κράτητι (only in Stobaeus, = 1.38.9; clearly deleted in Ps.-Plutarch);
 14. 5.7 Λεωφάνης οὗ μὲνηται Ἀριστοτέλης (only in Ps.-Plutarch because Stobaeus is not extant; reference perhaps excised by Ps.-Plutarch; the text alluded to is *De gen. anim.* 765a25);
 15. 5.20.1 ἔστι πραγματεία Ἀριστοτέλους, ἐν ᾗ τέσσαρα γένη ζῴων φησί (only in Ps.-Plutarch, not in Stobaeus, although this lemma is extant (= 1.43); Diels rejects, perhaps rightly, as foreign to style of Aëtius).

The numerous problems furnished by this list need not delay us. Although the harvest is relatively thin, it is clear that Aëtius does cite sources from time to time. This method is thus not entirely foreign to his way of writing doxography. On 9 occasions the reference is only preserved in Stobaeus. This indicates that if Aëtius' manual had been preserved in its entirety, it may well have contained more references and quotations. It is the kind of material that an abbreviator such as Ps.-Plutarch is inclined to leave out.

But in order to determine the relevance to our text we have to look at these texts more closely. They can be divided into three groups (omitting the problematic no. 15):

- (a) reference given for a report by another author on the main doxa: nos. 1, 2, 10, 11, 14;
- (b) reference given for an illustration or further elucidation of the main doxa: 3, 5, 6, 7, 8, 12;
- (c) reference given directly for the main doxa: 4, 13.

It emerges that if our text were to give a direct report of Theophrastus' views it would join the third and by far smallest group, with only two parallels, one of which is hardly relevant (no. 13). So there is only one real parallel, a Stobaeian text located in the Aëtian chapter equivalent to Ps.-Plutarch 1.28:⁴³ Ζήνων ὁ Στωικὸς ἐν τῷ Περὶ φύσεως. But this text has no verb. In our text, however, Aëtius (i.e. via Stobaeus) uses the verb γέγραφε. In four other texts, nos. 1, 2, 6, 12, (cf. 13), Aëtius uses the verb γράφειν to refer to what an author has affirmed in a

⁴³ The context here is a somewhat unusual section of the *Placita*, as we shall see below.

124 Theophrastus

written source. This verb is clearly more likely to introduce a report (no. 1, 2) or an illustration (6, 12) of a doxa than a doxa *tout court*.⁴⁴ We may conclude, therefore, that these two considerations on the use of a reference and the verb it contains give strong support to the contention that Theophrastus is not the author but the reporter of the doxa. This conclusion is further strengthened by the fact that in a chapter rather close by (Ps.-Plutarch 2.29, no. 11) Theophrastus is again referred to, this time in a manner that unambiguously shows him to be reporting the doctrine of a Presocratic.

(ii) What, we may next ask, is the explicit role that Theophrastus plays in the *Placita* of Aëtius?⁴⁵ It emerges that this role is modest indeed. The only references are the following:

1. Preface: 'Αριστοτέλης δὲ καὶ Θεόφραστος καὶ σχεδὸν πάντες οἱ Περιπατητικοὶ διείλοντο τὴν φιλοσοφίαν οὕτως ... (only in Ps.-Plutarch; the equivalent section in Stobaeus is lost);
2. 1.29 Θεόφραστος προσδιαρθροῖ ταῖς αἰτίαις τὴν κατὰ προαίρεσιν· φέρεται δὲ πῶς εἰς τὸ εἰμαρμένην εἶναι τὴν ἐκάστου φύσιν· ἐν ᾗ τόπον τεττάρων αἰτιῶν ποικίλων, προαιρέσεως (φύσεως) τύχης καὶ ἀνάγκης. (only in Stobaeus, = 1.6.17c; according to Diels part of Aëtius' chapter on τύχη);
3. 2.20 = our lemma
4. 2.29 = lemma where Theophrastus reports on Anaxagoras cited above.

Even if the loss of much of Stobaeus means one or two doxai may have been mislaid, it is clear that Theophrastus as philosopher effectively falls outside the scope of the *Placita*. In only one text is a doxa of his independently recorded, and this happens to be part of a group of chapters on necessity, fate and chance (Ps.-Plutarch 1.25-9) which deviate from the usual method and content of the *Placita* (and which Diels found virtually impossible to reconstruct).⁴⁶ We may also compare statistics which indicate how the members of the Peripatetic school fare in the *Placita*:⁴⁷

Aristotle	64
Theophrastus	2 (or 3)
Dicaearchus	3
Strato	15
Critolaus	2
Clearchus	1
Peripatetics in general	6

⁴⁴ Note the same procedure at Aristotle *DC* 2.13 293b34, ὥσπερ ἐν τῷ Τιμαίῳ γέγραπται. I thank Prof. A. Laks for bringing this point to my attention during the discussion at Eresos.

⁴⁵ By 'explicit' I mean direct reference, i.e. not the question whether much of the doxographical material may ultimately have been derived from the Eresian.

⁴⁶ One might conjecture that Aëtius has integrated an originally separate doxographical source on the various αἰτίαι into the fabric of the *Placita physica*. Compare the quite different chapter on causes at Ps.-Plutarch 1.11.

⁴⁷ Based on Diels' reconstruction in the DG.

Theophrastus, generally known as the faithful pupil and heir of Aristotle, recedes almost totally in the shadow of his master.

(iii) Finally there is the question of parallel sources. Three other doxographical sources (using the term in a general sense) are relevant:⁴⁸

α. Hippolytus *Ref.* 1.14.3 Marcovich:

Ξενοφάνης ... τὸν δὲ ἥλιον ἐκ μικρῶν πυριδίων ἀθροιζομένων γίνεσθαι καθ' ἐκάστην ἡμέραν· τὴν δὲ γῆν ἄπειρον εἶναι καὶ μήτε ὑπ' ἀέρος μήτε ὑπὸ τοῦ οὐρανοῦ περιέχεσθαι. καὶ ἀπείρους ἡλίους εἶναι καὶ σελήνας, τὰ δὲ πάντα εἶναι ἐκ γῆς.

β. Ps.-Plutarch *Stromateis* apud Eusebium *PE* 1.8.4 Mras:

Ξενοφάνης ... φησὶ δὲ καὶ τὸν ἥλιον ἐκ μικρῶν καὶ πλειόνων πυρίων [πυριδίων emend. Diels] ἀθροίζεσθαι ... γίνεσθαι δὲ ἅπαντα ἐκ γῆς, τὸν δὲ ἥλιόν φησι καὶ τὰ ἄλλα ἄστρα ἐκ τῶν νεφῶν γίνεσθαι.

γ. Achilles *Isagoge* 19, 46.10 Maass:

τινὲς δὲ τῶν φυσικῶν ἐξ ἀναθυμιάσεως γῆς καὶ νεφῶν αὐτὸν [τὸν ἥλιον] εἶναι.

In both Hippolytus and Ps.-Plutarch *Stromateis* the 'Theophrastean' doxa is clearly attributed to Xenophanes. Both texts possess verbal similarities with Aëtius, as can be seen in the terms πυρίδια and ἀθροίζεσθαι, although there is no mention of the moist exhalation. In the second text we see that also the other Aëtian doxa turns up. As in the Ps.-Plutarchean *Placita*, it is placed in parallel with the other doxa, not combined. The third text differs. It is presented as anonymous, but clearly Xenophanes is meant. This time the 'firelets' are not mentioned, but there is a reference to an exhalation. The author combines the two doxai in a rather clumsy fashion, no doubt the result of an attempt at extreme compression.

Now on the basis of these texts it requires no great powers of logic to reach the following disjunction:

if Stobaeus correctly reports Aëtius, i.e. one lemma is Xenophanean, the other Theophrastean, *then*

either it is a pure coincidence that Ps.-Plutarch and both Hippolytus and the *Stromateis* attribute the same Theophrastean doxa erroneously to Xenophanes, *or* the two other sources are dependent in this instance on Ps.-Plutarch.

The only *tertia via* in this dilemma is to argue that Ps.-Plutarch was aware of a tradition that combined the doxai and thus rectified what he considered to be a

⁴⁸ These are not cited by Steinmetz, while Mansfeld only briefly mentions the first. Diels cited the first two in his conspectus (DG 140), and prints the third at the bottom of 348. But he was led astray by his conviction that Achilles was dependent on the Ps.-Plutarchean *Placita*.

mistake in Aëtius. This, however, is a rather unlikely move for an epitomator to make. Everything points to the conclusion that there were two separate traditions in the doxographical tradition which attributed slightly differing doxai on the substance of the sun to Xenophanes.

(b) from the perspective of Xenophanean cosmology

That Xenophanes should have had a double explanation for the nature of the sun is surely plausible enough. It is possible that the tradition has recorded statements made in different poems.⁴⁹ It is equally possible that reflection on his 'cloud' theory lead the Presocratic thinker to a certain amount of differentiation between the different types of ignited cloud, but that these views were obscured in the transition into doxographical form. If the stars, sun, moon, and even comets, the rainbow and St. Elmo's fire are all ignited clouds, surely there are questions to answer. For example, why is the moon so different in appearance to the sun? why are the stars so much smaller than the sun, giving off almost no light and no heat? To the first question his answer is, if my reconstruction of Aëtius' chapter on the substance of the moon is accepted, that the moon is ignited cloud in a state of some condensation.⁵⁰ An answer to the second question is perhaps found in two alternatives of our text. It is possible that Xenophanes attempted a connection between the tiny fire-clouds of the stars and the massive fire-cloud of the sun, i.e. that they both consist of the same material but that the sun is like a whole lot of stars massed together.⁵¹

But it is important to recognize that all this is pure speculation. Because we do not have the relevant lines from the poem(s),⁵² we cannot go back behind the doxographical texts with any certainty. This is sad but true, and forms some justification for the lengthy treatment that these texts receive in the present paper.

(c) from the perspective of Theophrastus' physics and cosmology

Finally we return to Theophrastus himself. Is it possible to go along with the philosophical arguments of Steinmetz, in relation to which it might seem plausible that the doxa in Stobaeus represents a genuinely Theophrastean position? At this

⁴⁹ The process of forming doxai on the basis of poetic utterances could do with more study.

⁵⁰ *Art. cit.* (n.2) 267.

⁵¹ Cf. Guthrie *op. cit.* (n.36) 392 and n.1. Note the parallelism between the view in Ps.-Plutarch (taking the preferred reading) that the sun is ἐκ νεφῶν (πεπυρωμένων) and the report of Theophrastus and Hippolytus that the sun is ἐκ πυριδίων (συν)αθροισμένων.

⁵² The only lines we have are on the rainbow, fr. 21B32 DK (the previous fragment on the sun is not helpful): ἦν τ' Ἴριν καλέουσι, νέφος καὶ τοῦτο πέφυκε, πορφύρεον καὶ φοινίκεον καὶ χλωρὸν ἰδέσθαι.

It is to be admitted that these lines do not suggest a great amount of sophisticated quasi-scientific differentiation.

point we shall be much aided by the excellent discussion by Sharples which we introduced at the beginning of our article.

Sharples points out that two basic perspectives can be put forward on Theophrastus as a natural philosopher.⁵³ The first is that he basically works within the framework of Peripatetic theory, which of course is primarily based on Aristotle's philosophy, but that within that framework he maintains an aporetic attitude, treating individual questions on their merits and showing a readiness to modify doctrines where that proves necessary. The alternative view, most forcefully put forward by Steinmetz, is that Theophrastus has developed a systematic position of his own which in certain areas differs markedly from his teacher and colleague Aristotle. In his own discussion Sharples himself adopts an aporetic and somewhat piecemeal approach, dealing with each question on the basis of the evidence available and not coming to firm conclusions. It is clear, however, that he finds Steinmetz's arguments insufficient to prove his case, and with this I am entirely in agreement. In the present context I shall bring forward only the most salient points.

(i) The problem in determining Theophrastus' views on the heavens and their relation to the terrestrial realm is a severe lack of evidence. The abandonment of the theory of the ether and the sharp division between supra- and sub-lunary realms is a development of such importance that we must demand solid grounds for it. The metaphysical fragment casts doubts on some of the more speculative aspects of Aristotle's cosmology, most notably that the motion of the heavenly bodies is caused by their rational desire for the first principle. It is important to note, however, that no doubts are uttered on the *substance* of heavens.⁵⁴ Evidence for Theophrastus' verdict on the Aristotelian doctrine of the quintessence is thin.⁵⁵ In the extant works it is not explicitly referred to. A fragment of Taurus preserved via Philoponus reveals him arguing against the Platonic view that the stars consist of earth and fire and "introducing the fifth body that moves in a circle".⁵⁶ The context may be dialectical here, but one feels that Steinmetz divests himself of the evidence far too easily.⁵⁷

(ii) Some information furnished by the extant treatises is vigorously invoked by Steinmetz. The problem here is that the discussions in *De igne* and *De ventis* are deliberately limited in scope and aporetic in method. In *De igne* 4-7 Theophrastus raises the issue that fire always requires nourishment, which might appear to disqualify it as an ἀρχή, i.e. primary substance. He allows, however, for the

⁵³ TH 578.

⁵⁴ Cf. Sharples TH 589f.

⁵⁵ In addition to Sharples, cf. P. Moraux, Art. "Quinta essentia", RE 2.24 (1963) 1231-2.

⁵⁶ Taurus ap. Philop. *adv. Procl.* 13.15, claimed by Usener and Diels for the Φυσ. δόξ. fr. 21.

⁵⁷ PT 163: "doch auch diese Stelle fügt sich, richtig verstanden, zwanglos in unsere Interpretation ein". Attack would appear to be the best form of defence.

possibility that in the first heavenly sphere there is such a substance which is pure heat. But, as Sharples acutely observes,⁵⁸ even if the sun were to be regarded as such, it would be a different form of fire, i.e. one that did not need to consume fuel in order to burn, as earthly fire does. At *De ventis* 15 we find a discussion on the influence of the sun on the wind, especially at sunrise. When the moisture of the exhalation that rises is limited, the sun overpowers it and exhausts it,⁵⁹ thereby causing the wind to drop, whereas if the moisture is greater, it causes the wind to become stronger. Here too the discussion is limited in focus, no more than a process of evaporation being envisaged. That the sun should require this moisture as sustenance is a radical extrapolation not warranted by the context.

(iii) Finally I wish to cite two reports not dealt with by Sharples, which I believe to be of relevance. In a fragment of his *Περὶ τοῦ οὐρανοῦ* Theophrastus affirms of the heaven:⁶⁰ εἰ γὰρ θεὸς ἐστὶ καὶ τὴν ἀρίστην ἔχει διαγωγὴν, ἔμψυχός ἐστιν. It is of course possible to regard the εἰ as purely *ex hypothesi*, i.e. if you have a view of the heavens such as Plato in the *Timaeus*, then the logical consequence is ... The divinity of the heavens is also stressed, however, in the doxographical report on his theology in Cicero *DND* 1.35. The evidence is thin, but does not lead us in the direction that Theophrastus wished to minimize the difference between the heavenly and earthly realm. It is to my mind unlikely that he would wish to maintain that the sun is dependent for its continued existence on sustenance from the moist exhalation. Does this not bring the sun too close—both physically and metaphorically—to the earth? Aristotle, it is worth noting, regarded this view as ridiculously unsophisticated.⁶¹ Is it likely that his closest collaborator would revert to something like this view? Surely it is more likely to have been of the opinion of a much earlier thinker, who in an authentic fragment stresses the role of the sea in the formation of clouds, winds and rivers (21B30 DK). Indeed one can easily imagine that our ‘Theophrastean doxa’ was first formulated on the basis of a combination of these verses with the view that heavenly bodies are clouds.⁶² An objection to this view is obvious. The Stoics, and especially Cleanthes, were attached to the view that the heavenly bodies were nourished by exhalations from the ocean.⁶³ So it may be concluded that the view attributed to Theophrastus in Stobaeus was perfectly acceptable in the early 3rd century B. C. One could even argue that

⁵⁸ TH 581; see the entire discussion on *De igne* 4-7 at 580-3.

⁵⁹ 16.4-7 Coutant: ὅταν μὲν γὰρ ἔλαττον ἢ τὸ ἀνηγμένον ὑγρὸν, τούτου κατακρατῶν ἐξανήλωσε καὶ κατέπαυσεν ὁ ἥλιος· ὅταν δὲ πλέον, συμπαρώρμησε καὶ σφοδροτέραν ἐποίησε τὴν κίνησιν.

⁶⁰ Procl. in *Tim.* 2.122.15 Diehl.

⁶¹ *Meteorol.* 2.11 354b33f.: διὸ καὶ γελοῖοι πάντες ὅσοι τῶν πρότερον ὑπέλαβον τὸν ἥλιον τρέφεσθαι τῷ ὑγρῷ.

⁶² One verse is cited by Aëtius in the doxography on clouds etc. (Ps.-Plutarch 3.4, text preserved at Stobaeus 1.31.4).

⁶³ Cf. D. E. Halm, *The Origins of Stoic cosmology* (Ohio 1977) 151-3, where relevant texts are cited.

the Stoa may have derived it from Theophrastus himself! It would distract us too much from our subject to deal with this objection adequately. Suffice it to say that (1) contrary to what we find in Theophrastus, the doctrine of the cosmic *logos* or *pneuma* does bridge the gap between celestial and earthly realms; (2) the emphasis on cosmobiology is far greater in the Stoa than in the Peripatos;⁶⁴ (3) the Stoic procedure of using the analogy between microcosm and macrocosm as a basis for syllogistic argument (i.e. if man needs food, so do the heavens and the cosmos as a whole) is quite foreign to the more empirical procedure of the Peripatos.⁶⁵

V. PROVISIONAL CONCLUSION

Enough arguments have been put forward and their purport is unmistakable. Diels was right in concluding that the report in Stobaeus should be read as indicating that Aëtius cited Theophrastus in support of the Xenophanean view on the substance of the sun. Although much of Steinmetz's discussion must be rejected, he is right in claiming that there is no reason to question the explicit attribution of the report to Theophrastus' *Physics*. Since the third book of the *Physics* is also entitled Περὶ οὐρανοῦ,⁶⁶ it is probable that Theophrastus presented the Xenophanean *doxographicum* in that context, as part of the preparation for his own views. In this he would be following the example of Aristotle in his Περὶ οὐρανοῦ.

VI. FURTHER ANALYSIS OF THE DOXOGRAPHICAL CONTEXT

The first problem that provoked this essay has thus now been solved. Yet I am not yet fully satisfied. Although our discussion so far has examined various aspects of the doxographical background, it has not furnished a satisfactory answer to the second question raised at the outset. I will offend no one if I assert that our doxographical sources were put together by men who were not exactly first-class minds. They may easily have made mistakes. In the case of our text, it appears that Stobaeus was at the very least careless in giving the impression that the doxa may have been the view of Theophrastus. The question that intrigues me, however, is whether these writers simply operated in a haphazard and unpredictable manner, or whether they did have a rationale but one which we may find hard to decipher.

⁶⁴ I do not think the arguments of M. van Raalte suggesting that Theophrastus espoused an organic or biological view of the cosmos threaten this assertion; see "The Idea of the Cosmos as an Organic Whole in Theophrastus' Metaphysics", in W. W. Fortenbaugh and R. W. Sharples (edd.), *Theophrastean Studies on Natural Science, Physics and Metaphysics, Ethics, Religion and Rhetoric* (New Brunswick 1988) 189-215.

⁶⁵ Cf. Hahn *op. cit.* 136-46 (with texts), arguing that the Stoa follows Plato rather than Aristotle.

⁶⁶ Simpl. in *Arist. Phys.* 1236.1. Note the verbal parallel to our text here, πυρὸς ... ἀθροίζοντος εἰς ἓν τὸ ἐν αὐτοῖς θερμόν.

An interesting comment is made by Sharples on this very problem. In a footnote he states that “the order in which the views of various philosophers are given in Aëtius II 20 is so apparently chaotic that it is not much help”.⁶⁷ The formulation is characteristically careful: the order is *apparently* chaotic, i.e. there may be rationale but Sharples cannot determine what it is. He does, however, make a dubious assumption, namely that the order he finds in DG 348-9 is correct. But how does he know this? Diels’ reconstruction might well be on the wrong track.

After a prolonged study of book II of Aëtius on cosmology, I am convinced that there is rationale behind this particular doxographical source. This rationale is difficult to perceive because it is based not on the history of philosophy, as we might expect, but on doxography’s origins in the dialectical method of argument.⁶⁸ The basis of the rationale can be formulated in a single principle, namely that in any given chapter the doxai are more important than the philosophers who hold them.⁶⁹ The structure of each chapter is determined not by the names of philosophers (as in the list given by Sharples in his footnote), but by their doxai, which are generally presented by means of a more or less extended diaeresis (often in the form of a διαφωνία or disjunction). A reconstruction, therefore, has to take into account not only the evidence supplied by the various witnesses to Aëtius’ text, but also the kind of analytical diaeretic structure that the chapter in question originally possessed. The latter can often only be perceived when our evidence is relatively complete, which is the case for book II, since Stobaeus has been entirely preserved for this section.

It would take us too long to present a detailed reconstruction of Aëtius’ chapter on the οὐσία of the sun, which is one of the lengthiest in the book.⁷⁰ What I will do is first briefly comment on the three main sources, then present a brief account of the chapter’s basic structure. In the course of the presentation it will become clear how it happened in the case of our Xenophanean-Theophrastean doxa that the two chief sources differ to such a marked degree.

Ps.-Plutarch’s aim is to abbreviate. Aëtius’ chapter contained more doxai than he wishes to retain. He reduces the original number of lemmata, whatever that was, to the following 9:

⁶⁷ TH 584 n.39.

⁶⁸ Expounded at length in the contribution of J. Mansfeld to this volume.

⁶⁹ Diels never really perceived this principle, although he comes close to stating it in his comments on Ps.-Plutarch 2.13 at DG 66: “Aëtius ... rectissime enim non ex philosophorum nominibus, sed ex opinionum cognatione continuationem quandam instituit.” The failure to follow up this insight vitiates his entire reconstruction of Aëtius’ original text.

⁷⁰ This will be presented in the monograph announced in n.2. In an appendix to this article I present the structure and reconstruction of the chapter as it will appear in that study.

Ps. -Plutarch 2.20

doxa

- | | |
|-------------------------------------|--|
| 1. Anaximander | fiery wheel etc. |
| 2a. Xenophanes I | firelets from moist exhalation |
| 2b. Xenophanes II | ignited cloud |
| 3. Stoics | intelligent ignited mass from sea |
| 4. Plato | mostly from fire |
| 5. Anaxagoras-Democritus-Metrodorus | glowing clump or rock |
| 6. Aristotle | sphere made of fifth body |
| 7. Philolaus | glassy, reflecting cosmic fire etc. |
| 8. Empedocles | two suns, archetype and reflection |
| 9. Epicurus | pumice-like earthy ignited concentration |

The briefest glance will show that the first doxai do not have a logical order. Anaximander is closer to Xenophanes II, while Xenophanes I is rather similar to the view of the Stoics. The remainder is not too implausible if one recognizes Aëtius' habit of grouping unusual views at the end. Only the view of Epicurus which brings up the rear would seem more appropriate after the group Anaxagoras-Democritus-Metrodorus, which contains two atomists.

The procedure of the anthologist Stobaeus is much more complicated. In compiling a kind of source-book for his recalcitrant son, he decides on a separate chapter on the sun, but finds the material in Aëtius too fragmented. He thus embarks on a course of what I call 'coalescence', grouping together lemmata pertaining to the same philosophers which were spread out over several chapters in Aëtius. This method, of course, entirely destroys the doxographical method of the original source, but since it is relatively transparent, it allows us to determine the additional material deleted by Ps.-Plutarch. Stobaeus contains the following doxai (ignoring the material coalesced from other chapters):

Stobaeus 1.25

doxa

- | | |
|--------------------------|--|
| 1. Xenophanes | ignited cloud |
| 2. Theophrastus | firelets from moist exhalation |
| 3. Anaximander | fiery wheel etc. |
| 4. Anaximenes | fiery |
| 5. Parmenides-Metrodorus | fiery |
| 6. Antiphon | fire encroaching on air |
| 7. Heraclitus-Hecateus | intelligent ignited mass from sea |
| 8. Anaxagoras | glowing clump or rock |
| 9. Thales | earthy |
| 10. Diogenes | like pumice stone |
| 11. Philolaus | glassy, reflecting cosmic fire |
| 12. Empedocles | two suns, archetype and reflection |
| 13. Epicurus | pumice-like earthy ignited concentration |
| 14. Parmenides | sun and moon separated from milky way |
| 15. Democritus | glowing clump or rock |
| 16. Cleanthes | intelligent ignited mass from sea |

132 Theophrastus

17. Aristotle

fifth element etc.

18. Zeno

intelligent, fiery, made of creative fire

All Ps.-Plutarch's doxai except one can be recognized here, as nos. 3, 2, 1, 16, –, 8+15, 17, 11, 12, 13. Various manipulations have to be carried out, however, before the real relationship between the two sources becomes clear. These I will set out in very brief fashion.

(i) Stobaeus begins with Xenophanes instead of Anaximander as in Ps.-Plutarch. The Theophrastus doxa is separated from it by a coalesced lemma on the solar eclipse taken from a later chapter (cf. Ps.-Plutarch 2.24.4). Anaximander comes as third.

(ii) Since both Anaximander and Parmenides-Metrodorus have exactly the same doxa, it is probable that Stobaeus has split them up. As we saw earlier in n.29, the attribution to Metrodorus is a mistake.

(iii) Heraclitus-Hecataeus have exactly the same doxa as is attributed to the Stoics in Ps.-Plutarch, but the Stoics are relegated to the end of the chapter. This is because Stobaeus tends to replace Aëtian material with more detailed accounts from another doxographical source, Arius Didymus, which he nearly always postpones to the end of the chapter. Originally Heraclitus-Hecataeus and Cleanthes the Stoic were grouped together.

(iv) The fact that the Platonic doxa in Ps.-Plutarch is missing in Stobaeus is no cause for alarm, since he often leaves them out and quotes Plato from the original. This time, however, he fails to do that, and the Platonic view simply drops out.

(v) Anaxagoras and Democritus have evidently been split up, while Metrodorus simply disappears (the group of three is confirmed by Theodoret, as we shall see).

(vi) Thales and Diogenes of Apollonia are new; they must have been deleted by Ps.-Plutarch. The following three doxai follow the same order.

(vii) The second Parmenidean doxa is puzzling, not because the name-label occurs twice—as we shall see this also occurs elsewhere—but because the moon is also involved. It is best to see this as a stray lemma from elsewhere, although it could have been placed at the end of the chapter after Epicurus.

(viii) The Aristotelian and Zenonian doxae at the end are from Arius Didymus, the former taking the place of the earlier short lemma still preserved by Ps.-Plutarch.

When these operations have been carried out, it emerges that the differences between the two main sources are far less than at first appears.

The third source is Theodoret, who draws on this chapter in his rapid survey of the disagreements of the philosophers on questions of physics. The diaeretic or diaphonic structure of the *Placita* is, of course, a godsend for Judaeo-Christian writers who wish to point out the disagreements of the philosophers in contrast to the unified revealed truth of scripture. Theodoret is more selective even than Ps.-Plutarch, recording 7 doxai:

Theodoret CAG 4.21

doxa

- | | |
|------------------------------------|-----------------------|
| 1 Xenophanes | ignited cloud |
| 2 Anaxagoras-Democritus-Metrodorus | glowing clump or rock |
| 3 Thales | earthy |
| 4 Diogenes | like pumice stone |

5 Aristotle	sphere made of fifth body
6 Plato	mostly from fire
7 Philolaus	glassy, reflecting cosmic fire

Clearly a big jump is made from Xenophanes at the beginning to Anaxagoras; after that a number of successive doxai are copied out. Only the Platonic doxa is a problem, since it occurs earlier in Ps.-Plutarch. Most likely Theodoret first passed it by, then later, when he reached Aristotle, decided that the *princeps philosophorum* should not be left out.

There is thus large-scale agreement in the three sources on what the original sequence in Aëtius was. Only the beginning of the chapter gives rise to problems that we have yet to resolve. This, of course, is the problem that started us off in the first place. The decisive clue, which Diels overlooked, is the fact that both Stobaeus and Theodoret commence with Xenophanes, in contrast to Ps.-Plutarch. We must further bear in mind that, since the doxa is more important than the name of the philosopher (i.e. the name-label), it may well happen that the same philosopher is referred to twice for differing doxai in the same chapter. This procedure, which from our perspective as historians of philosophy seems most odd, occurs on diverse occasions in Aëtius.⁷¹ It seems to me virtually certain that there were two doxai attributed to Xenophanes in this chapter. The 'cloud' doxa stood at the beginning, as preserved in both Stobaeus and Theodoret, while the 'exhalation' view was placed just before the doxa of Heraclitus-Hecataeus-Cleanthes, to which it is obviously thematically related.

The sequence of doxai that is thus gained for the chapter can be set out as follows:

I Xenophanes I	ignited cloud
II Anaximander	fiery wheel etc.
III Anaximenes-Parmenides	fiery
IV Antiphon	fire encroaching on air
V Xenophanes II	firelets from moist exhalation
VI Heraclitus-Hecataeus-Cleanthes	intelligent ignited mass from sea
VII Plato	mostly from fire
VIII Anaxagoras-Democritus-Metrodorus	glowing clump or rock
IX Thales	earthy
X Diogenes	like pumice stone
XI Aristotle	sphere made of fifth body
XII Philolaus	glassy, reflecting cosmic fire
XIII Empedocles	two suns, archetype and reflection
XIV Epicurus	pumice-like earthy ignited concentration

⁷¹ Examples can be seen at Ps.-Plutarch 1.15, 2.1, 2.12, 2.13, 2.24 (Xenophanes again) 2.31, 3.15, 4.8-9 (the doublets are easily seen in Diels' double columns). Note how in 2.13 Ps.-Plutarch jumps from the one doublet to the other. Often, but not always, these doublets occur because Aëtius has combined various subjects in one chapter.

134 Theophrastus

It required little effort to observe that this sequence is basically systematic. As in the case of the other long οὐσία chapters, there is a διαφωνία between the two basic positions on the heavenly bodies: (1) the heavenly bodies are made of fire or ether, i.e. quite different from terrestrial bodies; (2) the heavenly bodies are basically similar to the earth, though in a different state (e.g. ignited, glowing etc.).⁷² In between these two positions compromise positions are possible. The following diaeretic structure thus emerges:

- A pure fire (I-III)
- B fire in relation to other elements
 - i. air (IV-V)
 - ii. water (V-VI)
 - iii. fire and other elements (VII)
- C basically earthy (VIII-X)
- D exceptional views (XI-XIV)

The διαφωνία in the case of the sun cannot be very clear-cut. Because this celestial body more than any other exudes heat, even if its substance is thought to be basically earthy, there must still be a connection with the element of fire as the source of heat. Nevertheless the basic διαφωνία is clearly visible. The reader may wonder why in my schema I allow one lemma (i.e. V) to be mentioned more than once. This is because in the case of these longer chapters Aëtius, in addition to using the diaphonic-diaeretic procedure basic to the Placita, also likes to link together the various doxai in a kind of chain.⁷³ Hence the position of the Platonic doxa, which, because it admits to an admixture of other elements including earth, acts as a transition to the views in which the sun was a glowing or enflamed clump of earth.⁷⁴ On occasion this desire to concatenate views can be very artificial. It appears that Aristotle follows Diogenes because the latter speaks of rays from the ether, which induces the doxographer to introduce the doxa that the sun consists of the fifth, i.e. etherial, element. The final part of the chapter is in fact rather messy. Aristotle is awkwardly interposed between Diogenes and Philolaus,⁷⁵ while

⁷² See my analysis of Aëtius' chapter on the moon in *art. cit.* (n.2) 264, and the more detailed analysis of Book II to be published shortly.

⁷³ Diels DG 67 perceived this in the case of the chapter on the οὐσία of the stars (cf. n.69), but did little with it.

⁷⁴ In Ps.Plutarch the Platonic doxa reads only ἐκ πλείστου πυρός, in Theodoret τὸ μὲν πλείστον ἔχειν ἐκ τοῦ πυρός, μετέχειν δὲ καὶ τῶν ἄλλων σωμάτων. From the chapter on the οὐσία of the stars (2.13 in Ps.-Plutarch) it is clear that the latter is what is meant in this chapter and accounts for its position in the sequence.

⁷⁵ Philolaus is presented as explaining the heat of the sun in terms of an analogy with a giant magnifying glass. The doxa thus belongs to the earth group, for in the ancient perception glass, as Prof. Baltes points out to me, is viewed as earth with water admixed (cf. Plato *Tim.* 61b7).

the Epicurean doxa at the end is evidently related to the earlier doxa of Diogenes.⁷⁶

The macro-structure of the chapter is now clear (for a complete reconstruction see the appendix to this article). We are thus in a position to determine how our main witnesses dealt with the original Aëtian text and so gave rise to the problem that has been bothering us. Let us take a look over their shoulder:

(1) Ps.-Plutarch the epitomator decides to skip the opening Xenophanean lemma since he wants to start with the venerable Anaximander; then he moves along, omitting the lemmata of Anaximenes-Parmenides and Antiphon, until he reaches the second Xenophanean lemma. This he retains. But then he realizes that he can still easily append the first doxa he has omitted earlier. So he simply adds it, joining it on with the little word ἤ. Then he moves straight on to the Stoic lemma, to which the other Xenophanean doxa is related.

(2) Stobaeus the anthologist is on a different tack. He starts off with Xenophanes because this happens to be the first lemma and—following his practice in these chapters—joins it up with the doxa on eclipses in §24 by the same philosopher. Then, however, he perceives that he should have included the other Xenophanean lemma in the chapter on the sun's substance, and so appends it. Because he is still writing out Xenophanean doxai, he deletes the name-label. In so doing, however, he obscures the fact that the lemma still refers to Xenophanes and not to Theophrastus. Then he goes on to the next lemma (i.e. that of Anaximander).

This reconstruction is, needless to say, speculative, and depends on both authors making a corrective move. It has the merit, however, of being fully able to take into account the quite different methods used by the two men. Although the solution might seem not very different to that proposed by Diels, the result is in fact a good deal more satisfying, since it is based on a clear view of what originally stood in Aëtius, whereas in Diels the relation between the two columns remains, as so often, quite obscure.

Finally we turn to the single other witness to the contents of this doxography. In his §19 on the sun Achilles gives the following list of doxai (46.9-29):⁷⁷

1. Plato mostly from fire
2. some of the φυσικοί (= Xenophanes) from exhalation from the earth and clouds

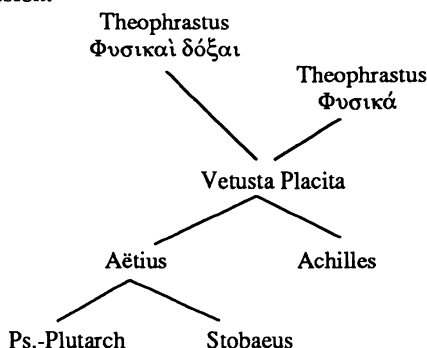
⁷⁶ Epicurus is regularly placed at the end of the chapter in Aëtius because of his consistent refusal to accept a single explanation in the case of physical questions. Cf. Ps.-Plutarch 2.2, 2.4 (comparison with Stobaeus shows that Epicurus occupied last place here in Aëtius), 3.15 and esp. 2.13, Ἐπίκουρος οὐδὲν ἀπογινώσκει τούτων, ἐχόμενος τοῦ ἐνδεχομένου. In our chapter only one of the alternatives originally given by Epicurus (for which cf. Lucr. 5.596-613, Diog. Oen. fr.8 Chilton, where note the crucial term ἐνδέχεται also used twice in 3.15) is recorded, but the final position is retained. The role of Epicurus in the Placita, and his relation to the original Theophrastean Φυσικαὶ δόξαι requires further investigation.

⁷⁷ It should be emphasized that what is preserved of Achilles is only a series of excerpts made by a later reader. This accounts for its formal imperfection.

136 Theophrastus

- | | |
|--------------------------------|--|
| 3. Anaxagoras | clump |
| 4. Philolaus | etherial fire concentrated through glass? |
| 5. Epicurus | pumice-like, emitting fire through holes |
| 6. some including Anaximander | emitting rays as from the hub of a wheel (!) |
| 7. others (Anaximander again?) | emitting light as from trumpet or bellows |

The difficulties raised by these doxai are very considerable, but for the most part they need not delay us now. Diels tried to persuade himself and others that Achilles was dependent on Ps.-Plutarch, but later saw that this position was untenable.⁷⁸ Much more probable is that Achilles has made use of the *Vetusta Placita*, and is thus a witness parallel to Aëtius.⁷⁹ Certainly the correspondence between the doxai of both authors is too close to be coincidental, without it being possible to reduce the one to the other. Achilles, as we saw earlier, records both the doxai found in Aëtius, but in a highly compressed way. It would, of course, be the simplest of procedures to speculate that the reference to Theophrastus' *Physics* was also already located there. If we further accept the view that much of the reportage on the physical theories of the Presocratics comes from the same writer's *Φυσικαὶ δόξαι*,⁸⁰ and speculate that the reports on Xenophanes' cloud theory in Aëtius come from various chapters of this work, then we could construct the following sequence of doxographical transmission:



This reconstruction is entirely in the spirit of Diels, the only changes being that the role of Theophrastus' *Physics* is properly recognized and the location of Achilles improved. A further challenge would be to attempt to incorporate the doxographical

⁷⁸ DG 17-27, esp. 22ff.; for the abandonment of this view cf. the remark recorded by G. Pasquali, *NAWG* 1910, 221 n.1.

⁷⁹ This can, however, only be regarded as a hypothesis at this stage. This solution to the problem of the correspondence between Achilles, Aëtius and the Scholia in the mss. of Basil's *In Hexaemeron* does not occur to Pasquali *ibid*.

⁸⁰ That Xenophanes' views were discussed there is confirmed by Galen *In Hipp. de Nat. Hom. Comm.* 1.2, 15.22ff. Mewaldt (= 21A36 DK), where the reader is invited to inspect the Epitome of Theophrastus' *Φυσικαὶ δόξαι* in order to confirm that Xenophanes is not reported there as saying that man's substance is earth.

reports of Hippolytus and Ps.-Plutarch *Stromateis* in such a schema.⁸¹

All this is very tempting, but in my view the temptation should be resisted. It cannot be emphasized enough that the doxographical tradition works by means of layers of accretion and adaptation, for the disentanglement of which naïve *Einquelle-Theorien* seldom work. Diels was fortunate that in the case of Aëtius the nature of the subsequent sources was such that direct verbal dependence could be demonstrated. Moreover, that a collection of placita existed somewhat like Diels assumed the *Vetusta Placita* to be cannot be doubted. But to try to connect these sources by means of a stemma such as given in the above diagram is methodologically misguided. For example, on the basis of the diagram we would have to conclude that Aëtius himself did not include material directly from Theophrastus' *Physics*.⁸² But how do we know this? The parallel passage in Achilles cannot solve the question. In fact we know almost nothing about Aëtius, and certainly not enough to determine whether he possessed the erudition and access to earlier writings which would allow him to add this laudatio.

For these reasons it is far better to adhere to the method used by Mansfeld in his examination of the Xenophanean dossier.⁸³ It is to be agreed that the doxographical vulgate is a composite construct, which cannot be reduced to a single Theophrastean source. This emerges very clearly when its epistemological, ontological and theological doctrines are examined. In the area of physics Mansfeld allowed that "single bits and pieces of what one may perhaps call his physical theory do have a Peripatetic provenance".⁸⁴ At least one such piece has emerged in this discussion, for that one part of the double *doxographicum* on the sun recorded in the *Placita* of Aëtius goes back to a Theophrastean *report* can no longer be doubted. Whether the other part also ultimately goes back to the industrious Peripatetic is a question we have to leave undecided.

VII. CONCLUDING REMARK

If a moral should be sought for this long and convoluted tale, let it be this. The doxographical tradition undoubtedly contains information which is of considerable value for reconstructing the views of ancient philosophers. This information must, however, be accepted on its own terms. The doxographical sources should not

⁸¹ On the *Stromateis* too Diels records an apodictic solution. At 21A32 he writes in a note to the words τῶν νεφῶν: "nämlich περὶ περιωμένων A38. 40. Dieser Satz stammt aus dem Kap. περὶ νεφῶν, dagegen τὸν ἥλιον ... ἀθροίζεσθαι aus dem Kap. περὶ ἄστρον des Theophrast. Werkes" [i.e. according to Diels the φυσικῶν δόξαι].

⁸² We recall (see above at n.7 and 11) that Diels vacillated on this question, in DG inclining to the view that the *Vetusta Placita* drew on Theophrastus, in DK that it was Aëtius.

⁸³ TX *passim*.

⁸⁴ TX 294.

be read with the facile assumption that they are simply doing history of philosophy in a clumsy or even perverse way. They have their own rationale. In the case of Aëtius his method is further obscured by the unfortunate manner in which his collection has been preserved. *Caveat qui utitur*.⁸⁵

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APPENDIX

(a) Reconstruction of Aëtius' chapter

Fontes:

Ps.-Plutarch *Placita philosophorum* 2.20, 90.10–91.19 Mau, Eusebius *Præparatio evangelica* 15.23, 400.9–401.10 Mras, Ps.-Galen *Philosophia Historia* 62, 625.24–626.12, Aëtius Arabus (= Qusṭā Ibn Lūqā) 2.20, 155–156 Daiber
Stobaeus *Eclogae Physicae* 1.25.1–3, 207.12–211.19 Wachsmuth
Theodoret *Curatio affectionum Graecarum* 4.21, 105.16–26 Raeder
Cf. Achilles *Isagoga excerpta* 19, 46.9–27 Maass

Περὶ οὐσίας ἡλίου¹

1 Ξενοφάνης ἐκ νεφῶν πεπυρωμένων² εἶναι τὸν ἥλιον.

2 Ἀναξίμανδρος κύκλον εἶναι ὀκτωκαίικοσαπλασίονα τῆς γῆς, ἄρματιου τροχῷ τὴν ἀψίδα παραπλήσιον ἔχοντα κοίλην³, πλήρη πυρός, κατὰ τι μέρος ἐκφαίνουσιν διὰ στομίου τὸ πῦρ ὥσπερ διὰ πρηστήρος αὐλοῦ· καὶ τοῦτ' εἶναι τὸν ἥλιον.⁴

3 Ἀναξίμενης Παρμενίδης πύρινον.

4 Ἀντιφῶν πῦρ ἐπινεμόμενον μὲν τὸν περὶ τὴν γῆν ὑγρὸν ἀέρα, ἀνατολὰς δὲ καὶ δύσεις ποιούμενον, τῷ τὸν μὲν ἐπικαιόμενον αἰεὶ προλείπειν, τοῦ δ' ὑπονοτιζομένου πάλιν ἀντέχεσθαι.

5 Ξενοφάνης, (ὥς)⁵ Θεόφραστος ἐν τοῖς Φυσικοῖς γέγραπεν, ἐκ πυριδίων⁶ τῶν συναθροιζομένων μὲν ἐκ τῆς ὑγρᾶς ἀναθυμιάσεως συναθροιζόντων δὲ τὸν ἥλιον.

6 Ἡράκλειτος Ἐκαταῖος Κλέανθης ἄναμμα νοερὸν⁷ ἐκ θαλάττης⁸.

7 Πλάτων ἐκ πλείστου πυρός⁹.

8 Ἀναξαγόρας Δημόκριτος Μητρόδωρος μύδρον ἢ πέτρον διάπυρον.

9 Θαλῆς γεώδη.

10 Διογένης κισσηροειδῇ τὸν ἥλιον, εἰς ὃν ἀπὸ τοῦ αἰθέρος ἀκτίνες ἐναποστηρίζονται.

⁸⁵ The research for this article was carried out with the financial support of the Netherlands Organization for Scientific Research (N.W.O.). My thanks above all to Prof. J. Mansfeld. Not only did this paper have its origin in discussions which we have been having together, but he also read and commented on at least two draft versions.

11 Ἀριστοτέλης σφαῖραν ἐκ τοῦ πέμπτου σώματος.

12 Φιλόλαος ὁ Πυθαγόρειος ὑαλοειδῆ, δεχόμενον μὲν τοῦ ἐν τῷ κόσμῳ πυρὸς τὴν ἀνταύγειαν, διηθοῦντα δὲ πρὸς ἡμᾶς τό τε φῶς καὶ τὴν ἀλέαν¹⁰, ὥστε προσεοικέναι ἡλίῳ τὸ ἐν τῷ οὐρανῷ πυρῶδες τό τε δὴ ἀπ' αὐτοῦ καὶ ἐσοπτροειδές, καὶ τρίτον τὴν ἀπὸ τοῦ ἐσόπτρου κατ' ἀνάκλασιν διασπειρομένην πρὸς ἡμᾶς αὐγὴν¹¹. καὶ γὰρ ταύτην προσονομάζομεν ἥλιον οἶονεῖ εἰδῶλον εἰδῶλου.¹²

13 Ἐμπεδοκλῆς δύο ἡλίους, τὸν μὲν ἀρχέτυπον, πῦρ¹³ ἐν τῷ ἐτέρῳ ἡμισφαίριῳ τοῦ κόσμου πεπληρωκὸς τὸ ἡμισφαίριον, αἰεὶ καταντικρὺ τῇ ἀνταυγείᾳ ἑαυτοῦ τεταγμένον· τὸν δὲ φαινόμενον ἀνταύγειαν ἐν τῷ ἐτέρῳ ἡμισφαίριῳ τῷ τοῦ ἀέρος τοῦ θερμομιγοῦς πεπληρωμένῳ, ἀπὸ κυκλοτεροῦς τῆς γῆς¹⁴ κατ' ἀνάκλασιν ἐγγιγνομένην εἰς τὸν ἥλιον τὸν κρυσταλλοειδῆ, συμπεριελκομένην δὲ τῇ κινήσει τοῦ πυρίνου· ὥς δὲ βραχέως¹⁵ εἰρήσθαι συντεμόντι¹⁶, ἀνταύγειαν εἶναι τοῦ περὶ τὴν γῆν πυρὸς τὸν ἥλιον.

14 Ἐπίκουρος γήινον πύκνωμα κισηροειδῶς καὶ σπογοειδῶς¹⁷ ταῖς κατατρήσεσιν ὑπὸ τοῦ πυρὸς ἀνημμένον.

SIGLA: P Ps.-Plutarch, S Stobaeus, E Eusebius, G Ps.-Galen, Q Qusṭā Ibn Lūqā, T Theodoret

1 SQ, καὶ ὅτι δύο καὶ τρεῖς εἰσίν, add. P, Περὶ ἡλίου EG

2 SE, P νέφος πεπυρωμένον P, νέφη πεπυρωμένα Q?

3 κοίλην PG κοῖλον E, ἔχοντα κοίλην περιφέρειαν S

4 αὐλοῦ ... ἥλιον om. S

5 addidi

6 ἐκ πυριδίων μὲν τῶν συναθροιζομένων ἐκ ... S

7 τὸ ins. S

8 Ἡράκλειτος ἄναμμα, ἐν μὲν ταῖς ἀνατολαῖς τὴν ἔξαψιν ἔχοντα, τὴν δὲ σβέσιν ταῖς δυσμαῖς G in ultimo loco, sed desunt in PEQ

9 μετέχειν δὲ καὶ τῶν ἄλλων σωμάτων T, fort. recte

10 S, τὸ φῶς PEGQ

11 ὥστε προσεοικέναι ἡλίου τὸ ἐν οὐρανῷ πυρῶδες τῇ ἀπὸ τοῦ ἐνόπτρου κατ' ἀνάκλασιν διασπειρομένη πρὸς ἡμᾶς αὐγὴ E

12 P, ὥστε τρόπον τινὰ διττοῦς ἡλίους γίνεσθαι, τό τε ἐν τῷ οὐρανῷ πυρῶδες καὶ τὸ ἀπ' αὐτοῦ πυροειδές κατὰ τὸ ἐσοπτροειδές· εἰ μὴ τις καὶ τρίτον λέξει, τὴν ἀπὸ τοῦ ἐνόπτρου κατ' ἀνάκλασιν διασπειρομένην πρὸς ἡμᾶς αὐγὴν S

13 πῦρ ὃν S

14 (αὐ)γῆς conj. Bernadakis

15 διὰ βραχείος E

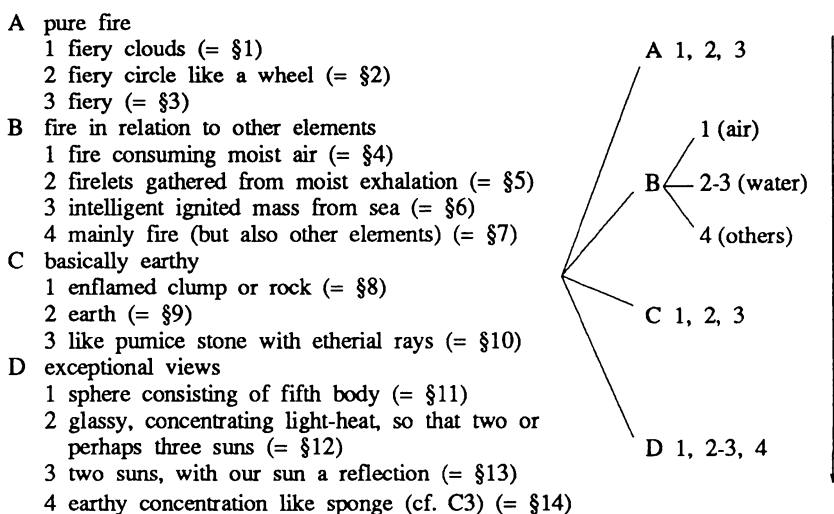
16 S, συντεμόντα PE

17 SQ?, κισηροειδῶς P, κισηροειδές καὶ σπογοειδές E, γήινον κύκλωμα, κισηροειδῆ καὶ σπογοειδῆ ταῖς κατατρήσεσιν ἐνημμένον G

§1 21A40 DK; §2 12A21 DK; §3 13A15, 28A41; §4 87B26 DK; §5 21A40 DK, Theophrastus fr.33 Wimmer, Diels *Phys.Dox.* fr.16 non recte; §6 22A12, 73B9 DK, SVF 1.501; §7—; §8 59A72, 68A87, 70A11 DK; §9 11A17a DK §10 64A13 DK, T27 Laks; §11 T19 Gigon; §12 44A19 DK; §13 31A56 DK, fr.322 Bollack; §14 fr.343 Usener.

140 Theophrastus

(b) outline of chapter's structure



(c) Comparison with Diels' reconstruction

Diels	1	2	3ab	4	5	6	7	8	9	10	11	12	13	14	15	16
Runia	2	4	1+5	6	7	8	8	4	9	10	11	12	13	14	4	6
Runia	1	2	3	4	5	6	7	8	9	10	11	12	13	14		
Diels	3a	3	2+8	15	3b	16+4	5	6+7	9	10	11	12	13	14		

‘Place’ in Context On Theophrastus Fr. 21 and 22 Wimmer

Keimpe Algra

INTRODUCTION

Fr. 21 and fr. 22 Wimmer—two passages in Simplicius’ commentary on Aristotle’s *Physics*—constitute virtually all the available information concerning Theophrastus’ ideas about place.¹ Fr. 21 (Simpl., *In Phys.*, *Corollarium de loco* [CAG vol. 9 p. 604.5-11 Diels]) contains a relatively straightforward enumeration of what Simplicius describes as a set of *aporiai* put forward by Theophrastus in connection with Aristotle’s famous final definition of place as the ‘inner boundary of the surrounding body’. As to fr. 22, an allegedly *verbatim* quotation (Simpl. *In Phys.*, *Corollarium de loco* [CAG vol. 9 p. 639.13-22 Diels]), the situation is more complicated. In the first place, it is not immediately clear what exactly Theophrastus was trying to convey in these rather condensed phrases. As a result opinions differ as to how the contents of this fragment relate to the *aporiai* of fr. 21 and to Aristotle’s theory of place. Secondly, it may well be asked to what extent Theophrastus was himself positively committed to the ideas expressed in fr. 22. Thirdly, a careful assessment of the context in which Simplicius quotes this passage is needed, for it is not immediately clear what position Simplicius assigns to Theophrastus’ conception of place in his *Corollarium de loco*.

The existing scholarly literature on Theophrastus’ conception of place is not extensive. As to the problem of the interpretation of the more crucial fr. 22 the *status quaestionis* is, roughly, as follows. According to what I shall refer to as the ‘traditional’ view—a view defended by Jammer and Sambursky—fr. 22 testifies to Theophrastus’ having developed a ‘relational’ theory of place as a full-blown

¹ For some other testimonia of minor importance—not to be found in Wimmer’s edition—see Simpl., *In Phys.* pp. 566, 18; 583, 7 ff.; 606, 32 (= Eudemos fr. 79a, b and c Wehrli).

alternative to Aristotle's defective theory.² Sambursky characteristically compared the view expressed in Theophrastus fr. 22 with Leibniz's theory of place. Pierre Duhem, on the other hand, saw fr. 22 as dealing with the primacy of *natural* place and, more or less following Simplicius, assumed a close resemblance between this view and Damascius' theory of 'essential place' (*topos ousiōdēs*).³ Unfortunately, however, these scholars offered little beyond a categorical statement of their position. Hence they left room for a more detailed analysis of both fr. 21 and 22.

Such an analysis has now been provided by Richard Sorabji in his challenging paper 'Theophrastus on Place' and in the two relevant chapters of his book *Matter Space and Motion*.⁴ As a result, any attempt to study Theophrastus' fragments on place should come to terms with Sorabji's interpretation, the more so since this interpretation is rather radically opposed to the traditional view. According to Sorabji, fr. 22 should not be read as representing anything like a fully developed concept of place. Rather it is best understood as an argument (or rather an objection) with a much more limited scope, specifically directed against Aristotle's conception of (the dynamic character of) *natural* place.⁵

The aim of the present study is to determine what position should be assigned to Theophrastus' ideas about place in general, and to fr. 22 in particular, in the *Rezeptionsgeschichte* of Aristotelian physics. To this purpose we shall concentrate on the three main items already referred to, viz. (1) the interpretation of fr. 22 in relation to fr. 21 and to Aristotle's theory of *topos* to be found in the *Physics*, (2) the problem of Theophrastus' commitment, and (3) the question as to how our source Simplicius interprets, or misinterprets, Theophrastus' position.

The structure of the present study, accordingly, is as follows. Section (I) contains some observations on the systematic difficulties inherent in Aristotle's theory of *topos* which may plausibly be regarded as providing the background of Theophrastus'

² M. Jammer, *Concepts of Space*, Cambridge, Mass. 1954, 21; S. Sambursky, *The Physical World of Late Antiquity*, London 1962, 2; idem, *The Concept of Place in Late Neoplatonism*, Jerusalem 1982, 12-13. See also P. Steinmetz, *Die Physik des Theophrast*, Bad Homburg 1964, 156-7.

³ P. Duhem, *Le système du monde*, vol. 1, Paris 1913, 349-50.

⁴ R. Sorabji, 'Theophrastus on Place', in: W.W. Fortenbaugh and R.W. Sharples (eds.), *Theophrastus as Natural Scientist* = Rutgers Studies in Classical Humanities 3, 1988, 139-66. Since the contents of this paper substantially reappear in the relevant chapters (viz. ch. 11 'The Immobility of Space', and 12 'Is Space Inert or Dynamic') of R. Sorabji, *Matter, Space and Motion; Theories in Antiquity and their Sequel*, London 1988, references will be to the book.

⁵ As noted, Duhem also believed fr. 22 to be primarily dealing with a conception of natural place opposed to Aristotle's. According to him, however, it is not so much the alleged *dynamic character* of Aristotelian natural place that Theophrastus is objecting to, but rather Aristotle's idea that natural place is logically posterior to place as such (a relation which, he claims, Theophrastus wanted to be reversed). For my rival view of the relation place-natural place in Aristotle and Theophrastus see below, Section II.

aporiai in fr. 21. I shall argue that at least four out of these five *aporiai* (including the one dealing with the immobility of place) concern problems arising from Aristotle's *reified* conception of place. This, I argue, is one *prima facie* reason to believe—*pace* Sorabji—that Theophrastus fr. 22, which explicitly swaps the conception of *topos*-as-a-thing for *topos*-as-a-relation, should be regarded as providing an alternative to Aristotle's conception of place *in general*, rather than a mere alternative conception of *natural place*. This stance will be further defended in Section (II), which studies the role of natural place in Aristotle's physics and in Theophrastus fr. 22 in some more detail. Section (III) deals with the problem of Theophrastus' commitment to the contents of fr. 22. Section (IV), finally, attempts to determine what position Simplicius assigns to Theophrastus fr. 22 in his historical survey of concepts of place in the *Corollarium de loco*. It will be shown that Simplicius groups together Theophrastus, Iamblichus and Damascius on the basis of a rather limited common ground between their theories. This is done in the context of an elaborate (and allegedly complete) division (*diaeresis*) of conceptions of place. I shall attempt to show that a closer study of the structure of this *diaeresis* reveals how Simplicius interpreted the text of our Theophrastus fr. 22. Since Simplicius apparently had first-hand knowledge of Theophrastus' *Physics* and since on the other hand there are hardly any reasons to assume that Simplicius misrepresents or misunderstands Theophrastus' position, the way he interprets fr. 22 himself is of great interest. Our conclusions are summarized in Section (V).

The resulting interpretation of Theophrastus' position differs both from the traditional one and from that put forward by Sorabji. I shall argue, against the 'traditional' view, that the evidence does not indicate that Theophrastus ever worked out the suggestions of fr. 22 into a detailed and coherent alternative theory of place. Even if the fragment represents ideas endorsed by Theophrastus *in propria persona*, as I believe it does, we should take into account that its phrasing points to a dialectical context. At the same time I dissent from Sorabji's interpretation in that I do not believe that the argument has Aristotle's concept of *natural place* as its exclusive, or even primary, target. The present study should therefore be regarded as an attempt to defend a qualified version of the traditional view by means of a closer study of the preserved evidence.

I. FR. 21 WIMMER AND ITS ARISTOTELIAN BACKGROUND

One of the more salient features of the dialectical inquiry into the nature of place (*topos*) to be found in the fourth book of Aristotle's *Physics* is the complete rejection of the concept of place as an underlying self-subsistent three dimensional extension. Aristotle nevertheless describes this concept as one which easily comes to mind because it is part and parcel of the way in which people ordinarily think and speak about *topos*. He adds two factors which may be held responsible for this wrongheaded common conception. For one thing, the phenomenon of air

seeming to be incorporeal apparently adds to the suggestion that place is a three dimensional incorporeal something in which things are located. According to Aristotle, however, the main reason why people go astray in this respect is that they draw the wrong conclusion from the fact that replacement presupposes fixed surroundings (apparently in the sense of 'a fixed frame of reference'). For they think this entails what remains fixed being an underlying extension (*diastēma*) which is different from the extension of the bodies replacing each other.⁶

It should be noted, however, that although Aristotle rejects this inference, he nevertheless subscribes to the premiss that replacement presupposes a fixed surrounding *something*, a vessel, a that-which-stays-behind. In other words, even if the location of a body is to be defined in relation to its surroundings rather than in terms of an underlying extension, Aristotle does not go so far as to define place itself as a *mere relation*. Instead, he sticks to a more naive reified conception of place. I want to suggest that some serious systematic problems to which this *Verdinglichung* of Aristotelian place-as-a-surface give rise are well brought out in (at least four of) the *aporiai* listed in Theophr. fr. 21. The fragment runs as follows:

One should know that in his *Physics* Theophrastus too raises difficulties (*aporei*) of the following sort against Aristotle's account of place:

- (1) a body will be in a surface;
- (2) place will be in motion;
- (3) not every body will be in a place—not the sphere of the fixed stars;
- (4) if the spheres are taken together, the heaven as a whole will also not be in a place;
- (5) things in a place will no longer be in a place if, without their changing themselves at all, their surroundings are removed.⁷

Of these *aporiai* (3) and (4) take up the problem of the 'displacement' of the (outer sphere) of the heavens, a problem which is well known and much discussed among later commentators. Of course the reason why the outer sphere, paradoxically, is not in a place is that it has no 'surrounding something'.⁸ A connected, though less familiar, *aporia* is (5), which deals with a similar paradoxical displacement

⁶ *Phys.* Δ 212a7 ff.: 'Place appears to be something profound and difficult to grasp, both because the notions of matter and form present themselves together with it, and because of the fact that change of position of a moving body occurs within a surrounding body which is at rest; for [from this] it appears to be possible that there is an extension in between which is something other than the magnitudes which move. Air, too, contributes to this suggestion, by appearing to be incorporeal.'

⁷ Simpl., *In Phys.* p. 604.5-11: 'ιστέον δὲ ὅτι καὶ ὁ Θεόφραστος ἐν τοῖς Φυσικοῖς ἀπορεῖ πρὸς τὸν ἀποδοθέντα τοῦ τόπου λόγον ὑπὸ Ἀριστοτέλους τοιαῦτα· ὅτι τὸ σῶμα ἔσται ἐν ἐπιφανείᾳ, ὅτι κινούμενος ἔσται ὁ τόπος, ὅτι οὐ πᾶν σῶμα ἐν τόπῳ (οὐδὲ γὰρ ἡ ἀπλανής), ὅτι ἐὰν συναχθῶσιν αἱ σφαῖραι, καὶ ὅλος ὁ οὐρανὸς οὐκ ἔσται ἐν τόπῳ, ὅτι τὰ ἐν τόπῳ μὴδὲν αὐτὰ μετακινήθεντα, ἐὰν ἀφαιρεθῇ τὰ περιέχοντα αὐτά, οὐκ ἐν ἔσται ἐν τόπῳ.'

⁸ *Phys.* Δ 212a31: ᾧ μὲν οὖν σώματι ἔστι τι ἐκτὸς σώμα περιέχον αὐτό, τοῦτο ἐστὶν

of intracosmic substances if the requirements of the imagined experiment were fulfilled (i.e. if the immediately surrounding substances were taken away).⁹ Also (2), the objection that Aristotle's theory was apparently unable to account for the required immobility of place, was amply discussed among Aristotle's successors and commentators. My claim that this problem as well had its roots in Aristotle's reified conception of place calls for further comment.

There are basically two problems connected with the immobility of Aristotelian place. First, a specification is needed as to the sense in which place as a surrounding surface should be conceived as immobile. *With respect to what*, in other words, is it immobile? Here Aristotle himself is not very clear and explicit, though his cosmology in general does provide a few clues which were worked out by later Aristotelians, beginning with Eudemus of Rhodes.¹⁰ According to these elaborations

ἐν τόπῳ, ὃ δὲ μή, οὐ. Cf. also 212b8: ὁ δ' οὐρανός, ὥσπερ εἴρηται, οὐ που ὅλος οὐδ' ἐν τινὶ τόπῳ ἐστίν, εἴ γε μηδὲν αὐτὸν περιέχει σῶμα.

⁹ Here I disagree with Sorabji (*Matter, Space, Motion*, 197-8) who believes that also this *aporia* concerns the *immobility* of place. He maintains it must be about *replacing* rather than, as the text would seem to suggest, about *removing altogether* a thing's surroundings. He argues that if the paradox in this case consisted in the body at issue coming to have no place, although not changing itself, Aristotle could have replied (1) that the experiment could never be performed, and (2) that even if it were, we ought not to be surprised that the removal of *all* surroundings should suffice to deprive a thing of location. 'It is likely, therefore, that the experiment Theophrastus intends is the more familiar one of replacing, not removing altogether, a thing's surroundings' (*op. cit.*, 198). I would object, first, that the parallels adduced by Sorabji (*loc. cit.*) in support of this interpretation of the fifth *aporia* (John of Ripa, Simplicius and Philoponus, all dealing with the case of a person or thing surrounded by a draught of air, and hence by a moving surface) are better taken as illustrating the second *aporia* ('place will be in motion'). Secondly, as to Aristotle's imaginary ripostes, one may doubt the relevance of (1), as we are obviously dealing with a thought experiment. Neither, to my mind, can (2) be used to prove that Theophrastus *cannot* have meant that the removal of all surroundings deprives a thing of location. For the same idea underlies Theophrastus' third *aporia* (about the meaning of which there can be no doubt) in spite of the fact that there Aristotle could have made a similar reply. I conclude, therefore, that the fifth *aporia* is more easily explained along the lines sketched in the text above, viz. as showing one more absurdity following on the conception of place as a surrounding 'something'.

¹⁰ The issue is briefly discussed by Sorabji, *Matter, Space, Motion*, 190, but needs further study. One gets the impression that where Aristotle himself explicitly applies the immobility criterion he does not go beyond common experience which usually just *assumes* that one body is moving while something else remains at rest. In other words, he fails to offer a technical account of immobility. Still his cosmos contains fixed parts and fixed directions, such as ἄνω and κάτω which could in principle be used as reference points in a more technical explanation of the immobility of places. Eudemus *ap. Simplicius*. *In Phys.* p. 595.6-9 (= fr. 80 Wehrli) apparently took up this thread: τὸ γὰρ κινούμενον ἀγγειῶδες, καὶ διὰ τοῦτο τῶν τόπων τὴν ἀναφορὰν πρὸς τὸν οὐρανὸν ποιούμεθα. οὗτος γὰρ οὐ μεταλλάσσει τόπον ἄλλον κτλ. The same idea was worked out by medieval thinkers in their concept of *formal* (as opposed to *material*) place, on which see E. Grant, 'The Medieval Doctrine of Place: Some Fundamental Problems and Solutions' in: A. Maierù, A. Paravicini

of Aristotle's theory, the immobility of the surrounding surface should be defined in terms of a relation to fixed reference points such as the centre of the cosmos and the outermost heavenly sphere. Secondly, even if the concept of immobility itself could in this way be given clear outlines, we would still be left with the problem of the immobility of *Aristotelian place*. For such a 'reified' place, i.e. place as the surface of the (mobile) surrounding substance, can hardly be regarded as immobile in the required sense. Strictly speaking, Aristotelian ontology, treating surfaces as inextricably bound up with the bodies to which they belong, does not allow a satisfactory solution to the problems of the immobility of place. For surfaces of mobile substances are not themselves immobile, whereas the idea of a self-subsistent surface as a part of a kind of overall grid of (abstract) locations would be as alien to Aristotle's ontology as the idea of a self-subsistent three-dimensional extension. We may conclude that if place is considered as an immediately surrounding something, there is within the limits of Aristotelian ontology no such 'thing' which meets the requirement of immobility. Hence, not only *aporiai* (3), (4) and (5), but also (2) is in the end to be traced back to Aristotle's *Verdinglichung* of place. In that case we have a fairly strong *prima facie* argument in favour of the 'traditional interpretation' of fr. 22, according to which this fragment, insofar as it suggests viewing place no longer as a 'thing' but as the order and position of individual bodies, contains Theophrastus' alternative conception of place. We might, in other words, charitably credit Theophrastus with having signalled an important (if not the most important) weak spot in Aristotle's theory, and with having simultaneously suggested an alternative which would enable him to solve all five *aporiai* of fr. 21.

II. FR. 22 WIMMER: PLACE OR NATURAL PLACE?

There are two factors which might cast doubt on this interpretation of fr. 22 and of how it relates to fr. 21. First, fr. 22 appears to speak of *natural* place rather than of place *tout court*, an aspect which was given much weight in the interpretations of Duhem and Sorabji. Second, it may be argued that it contains an *objection*, presumably against Aristotle's theory of (natural) place, rather than any positive statement and hence that it remains to be decided to what extent Theophrastus was himself committed to its contents. We shall first concentrate on the former consideration, that is to say whether the two conceptions opposed in fr. 22 are conceptions of place or of *natural* place.

Fr. 22 presents us with what appears to be a *verbatim* quotation:

Also Theophrastus seems to have subscribed to this view in his *Physics*, in a passage where he continues his account in an aporetic fashion and says: 'Perhaps place (*topos*)

is not a substance in its own right (*kath' heautēn ousia tis*), but we speak of it because bodies have an order (*taxis*) and position (*thesis*) in conformity with their natures and powers, and similarly also in the case of animals and plants and in general of non-homoeomerous things, whether animate or inanimate, if they have a nature that exhibits form. For in these too there is an order and position of parts in relation to the whole substance. And this is why each of them is said to be in its own place through having its own proper order. For each part of the body too would desire and demand its own place and position.¹¹

As we noted, Richard Sorabji has defended the thesis that in this fragment Theophrastus is objecting to Aristotle's idea (expressed at *Phys.* Δ 208b10-11) of natural place having a kind of power (*dunamis*). As a result of Theophrastus' downgrading of the role of place in favour of the role of nature and form, Aristotle's habitual talk about natural places would turn out to be a mere *façon de parler*. On Sorabji's line of thought this downgrading of talk about place is best understood as a challenge to natural place, not to place in general. For, he argues, Theophrastus' suggestion 'would not cover the ordinary sense in which we say that a rock rolled along the ground has left its former place. At best it would only allow us to say that a rock has left its place, when it was thrown upwards in the air, contrary to the natural arrangement dictated by form. It is therefore easiest to suppose that Theophrastus believes some further conception of place is in play when we talk of things changing their place'.¹²

Let us note, to begin with, that both Simplicius' introduction and the first line of the fragment itself indicate that it contains an alternative conception of *topos* in general; talk about natural place only comes in later. Yet it should be admitted that the notion of *natural* place figures prominently. Judging from the last two phrases, both containing the formula *heautou chōra* ('proper place'), and from the fact that things are said to have a place 'in conformity with their nature and power', we might even say that the fragment is *primarily* concerned with natural place. Normally speaking, however, talk about natural place would seem to presuppose a more general concept of place-as-such. In Aristotle's *Physics* the two subjects are closely connected, natural place being regarded as a subspecies of place.¹³ Also

¹¹ Simpl., *In Phys.* p. 639.13-22: Καὶ γὰρ καὶ Θεόφραστος ἐν τοῖς Φυσικοῖς φαίνεται τὴν ἔννοιαν ταύτην ἐσχηκῶς περὶ τόπου ἐν οἷς φησιν ὡς ἐν ἀπορίᾳ προάγων τὸν λόγον μήποτε οὐκ ἔστι καθ' αὐτὸν οὐσία τις ὁ τόπος ἀλλὰ τῇ τάξει καὶ θέσει τῶν σωμάτων λέγεται κατὰ τὰς φύσεις καὶ δυνάμεις, ὁμοίως δὲ καὶ ἐπὶ τῶν ζῴων καὶ φυτῶν καὶ ὅλως τῶν ἀνομοιομερῶν εἴτε ἐμψύχων εἴτε ἀψύχων, ἔμμορφον δὲ τὴν φύσιν ἐχόντων. καὶ γὰρ τούτων τάξις τις καὶ θέσις τῶν μερῶν ἐστὶ πρὸς τὴν ὅλην οὐσίαν. διὸ καὶ ἕκαστον ἐν τῇ αὐτοῦ χώρᾳ λέγεται τῷ ἔχειν τὴν οἰκείαν τάξιν, ἐπεὶ καὶ τῶν τοῦ σώματος μερῶν ἕκαστον ἐπιποθήσειεν ἂν καὶ ἀπαιτήσειε τὴν ἐαυτοῦ χώραν καὶ θέσιν.

¹² Sorabji, *Matter, Space, Motion*, 203.

¹³ Cf. *Phys.* Δ 208b8 ff., where the phenomenon of natural motion is said to make clear not only that there is place, but also that place has a certain *dunamis*. This argument is connected, by the word ἔτι, to the preceding one, which in its turn is introduced by

the wording of fr. 22 points in this direction. The statement that the *proper* place (*heautou chōra*) is determined by the *proper* position (*oikeia taxis*) can only make sense if it be assumed that there is also a *non-proper* place being determined by a *non-proper* position. Hence, as a kind of common denominator, a general concept of place seems to be involved, a concept defined by order and position, which, as we shall see later on, is precisely the kind of concept with which Simplicius credits Theophrastus. Strong arguments are needed, therefore, to persuade us that in fr. 22 the conception of natural place is dealt with in complete isolation from any conception of place in general.

The main argument in favour of Sorabji's interpretation is Theophrastus' statement that we speak of place because bodies have an order and position *kata tas phuseis kai dunameis*—if, that is, these Greek words are translated as 'through their natures and powers'. In that case the implication is that the nature of bodies is the *sole* factor determining their place so that for any body to change place would be to exchange its natural place for an unnatural one (or *vice versa*). The conception of place which then results would indeed not cover the adventitious motion of, e.g., a stone rolled along the ground.

At this point, however, we are in danger of reading too much into the text. If we take the phrase *kata ... dunameis* in the most natural way, i.e. as meaning 'in accordance with their natures and powers',¹⁴ the implication is merely that, according to the natural tendencies of 'things', we assign to them natural as well as non-natural places. The upshot, in other words, is that things have a place assigned to them corresponding with their position, and, more specifically, a natural place which corresponds with their natural position. In that case there is no need to suppose that the conception of place outlined would not allow us to account for

ὅτι μὲν οὖν ἔστιν ὁ τόπος δοκεῖ δῆλον εἶναι ἐκ κτλ. The whole section is resumed at 208b28 by the statement ὅτι μὲν οὖν ἔστι τι ὁ τόπος παρὰ τὰ σώματα, καὶ πᾶν σῶμα αἰσθητὸν ἐν τόπῳ, διὰ τούτων ἂν τις ὑπολάβῃ. In other words, the common conception that there are natural places is introduced as one of the *phainomena* which are relevant in connection with the study of the nature of place *as such*. I cannot deal here with Sorabji's claim that 'Aristotle offers at least four views on place', viz. (1) place as a quantity in the *Cat.*, (2) natural place (in the *Cael.*), (3) in biology, the conception of up, down etc. being defined in terms of biological function, (4) the 'classical' conception of place outlined in the *Phys.* I merely wish to point out that the texts just referred to show that in Aristotle's 'classical' discussion of *topos*, i.e. in the *Physics*, (2) and (4) are regarded as connected.

¹⁴ Comparable translations are given by Sambursky: 'place ... is defined by the arrangement and position of bodies *in respect of* their natures and powers'; Duhem (*Système du monde* 1, 349): 'Peut-être le lieu n'a-t-il par lui-même aucune espèce d' essence, mais est-il simplement dénommé par la place et la position des divers corps, *en tenant compte de leurs natures et puissances*' [my italics]. Note, by the way, that Sorabji's translation only makes sense if the phrase *κατὰ τὰς φύσεις καὶ δυνάμεις* is taken as qualifying *τῇ τάξει καὶ θέσει*. However, I think it might equally well qualify the verb *λέγεται*. Duhem apparently opts for the latter version, whereas, as far as I can see, Sambursky's translation is ambiguous in this respect.

adventitious motion: we may surmise that according to Theophrastus a stone rolling down a slope changes place without *ipso facto* exchanging its natural place for an unnatural one.

Why then do the notions of the natural tendencies and natural position of things play such a prominent role in Theophrastus' sketch of a different conception of place? Here, for lack of context, we can only speculate. Still, I believe there are two plausible answers which present themselves. First, Theophrastus may well think it is the phenomenon of natural motion which is primarily responsible for our conception of place *tout court*. This appears to be a quite Aristotelian line of thought. Also at *Phys.* Δ 208b8 ff. the phenomenon of natural motion is adduced as one of the reasons why we think place exists. Second, the fact that there are *natural* places provides also Theophrastus' relational account of place with a fixed frame of reference (or better: with a number of fixed relations), and hence saves it from being completely relativistic. Also in this connection we may compare Aristotle *Phys.* Δ 208b8-26, where it is argued that the phenomenon of natural motion provides us with absolute and natural directions.¹⁵

So much for the interpretation of the text. Doubts, however, may be raised about the presupposition that there ever was such a thing as an articulate Aristotelian theory of dynamic natural places serving as a target for Theophrastus' objections. It can, I think, be convincingly argued that Aristotle's talk about the power of natural place is ultimately also nothing but a *façon de parler* in which case there is no need to suppose that Theophrastus' ideas about the inertia of natural place differed substantially from Aristotle's.

It should be noted, for a start, that Aristotle's remark about natural motion showing that place has a certain *dunamis* is part of a list of *prima facie* arguments for the existence of place as such.¹⁶ In the dialectical procedure of *Phys.* Δ these arguments merely constitute the first stage (the collecting of the *phainomena*). Certainly not all *phainomena* concerning place which are listed in this first section of *Phys.* Δ can stand up to Aristotle's further dialectical examination.¹⁷ Thus he does not himself ultimately subscribe to the idea that there is a void nor to the idea that place is prior to all other things (a supposition which he claims to underly Hesiod's famous line about *chaos*). Yet as preliminary *phainomena* these ideas are accorded the same position as the statement that place has a *dunamis*.¹⁸

¹⁵ Cf. esp. *Phys.* Δ 208b15 ff.: ἡμῖν μὲν γὰρ οὐκ αἰὲν τὸ αὐτό [scil. δεξιὸν καὶ ἀριστερόν], ἀλλὰ κατὰ τὴν θέσιν ... ἐν δὲ τῇ φύσει διώριστα χωρὶς ἕκαστον. οὐ γὰρ ὅτι ἔτυχεν ἐστὶ τὸ ἄνω ἀλλ' ὅπου φέρεται τὸ πῦρ καὶ τὸ κοῦφον κτλ. Here also, in other words, the implication is that mere localization by *thesis* without fixed determinations by *physis* would amount to a too relativistic account of place.

¹⁶ See above, note 13.

¹⁷ On Aristotle's dialectical procedure in his *topos* discussion, see my *Concepts of Space in Classical and Hellenistic Greek Philosophy*, diss. Utrecht 1988, 112-35.

¹⁸ Cf. *Phys.* Δ 208b25-27: ἔτι οἱ τὸ κενὸν φάσκοντες εἶναι τόπον λέγουσιν· τὸ γὰρ

Admittedly the latter statement is nowhere explicitly contradicted (although it does not recur anywhere either).¹⁹ This may indicate that Aristotle thought that this formula adequately covered the idea that natural place plays at least *some explanatory role* with regard to the natural movement of the elements. However this may be, he *does* explicitly reject the idea that (natural) place figures as a *cause*.²⁰ The objection that this rejection 'is merely part of a puzzle or *aporia*' will not do.²¹ For this could only be used as an indication that Aristotle is not speaking *in propria persona* if it could at the same time be shown that the thesis at issue is elsewhere explicitly contradicted by Aristotle (and hence the *aporia* accordingly shown to be harmless).²² This, however, does not appear to be the case. Aristotle *nowhere* speaks of natural place as a cause.²³

κενὸν τόπος ἂν εἴη ἐστερημένος σώματος. The role of this argument—as well as that of the preceding one (208b8-25) about the existence and *dunamis* of natural places—becomes clear in the next sentence (208b27-28): ὅτι μὲν οὖν ἔστι τι ὁ τόπος παρὰ τὰ σώματα, καὶ πᾶν σῶμα αἰσθητὸν ἐν τόπῳ, διὰ τούτων ἂν τις ὑπολάβῃ. Next (208b29-209a2) the reference to Hesiod is appended (δόξει δ' ἂν καὶ 'Ησίοδος ὀρθῶς λέγειν ποιήσας πρῶτον τὸ χάος κτλ.).

¹⁹ It may be significant that in the brief recapitulation (at *Phys.* Δ 210b32 ff.) of ὅσα δοκεῖ ἀληθῶς καθ' αὐτὸ ὑπάρχειν αὐτῷ (scil. τῷ τόπῳ) the idea of place having a *dunamis* does not occur although the fact that the difference between ἄνω and κάτω is in some way to be connected with the natural motion of the elements is explicitly mentioned. Neither do we find any reference to the *dunamis* of place in the section (212a21-30) where Aristotle argues that his theory fits a number of important data about place (on which see also below, note 28).

²⁰ *Phys.* Δ 209a18-22.

²¹ This objection is to be found in Sorabji, *Matter, Space, Motion*, 187, note 6; and idem, 'John Philoponus', in: R. Sorabji (ed.), *Philoponus and the Rejection of Aristotelian Science*, Ithaca, NY, 1987, 16, note 93.

²² This appears from the specific role which Aristotle assigns to *aporai* in what may be regarded as a programmatic statement of his procedure in the dialectical discussion of *topos* at *Phys.* Δ 211a7-11, where he professes that 'we must try to make our inquiry in such a way that the 'what it is' is provided, the *aporai* are solved, the apparent facts about place are accounted for, and, finally, so that the reason for the difficulty and for the problems around it are clear'.

²³ Sorabji, who takes Aristotle's natural place to figure as a final cause, admits this, *Matter, Space, Motion*, 186: 'The most likely explanatory role, *although he never says this*, is as a final cause or goal (not consciously sought) of motion' (my italics). In fact the only passage which comes close to explicitly identifying place with cause (but then rather with formal cause) is a somewhat obscure phrase at *Cael.* Δ 310b34-35: τὸ δ' εἰς τὸν ἑαυτοῦ τόπον φέρεσθαι ἕκαστον τὸ εἰς τὸ ἑαυτοῦ εἶδος φέρεσθαι. However, we can hardly imagine that Aristotle would choose this cumbersome formulation if he merely meant to say that natural place just *is* form. It should moreover be stressed that in the only really 'technical' discussion of the subject, i.e. in *Phys.* Δ, Aristotle takes great pains to show that place cannot be equated with form (209b17-210a9). What is more, he emphatically claims (210a2 ff.) that on the supposition that place is form (or matter) natural motion would be inexplicable. Nevertheless, it is not easy to determine what then the precise relation between form and natural place amounts to, as may appear from the *diaphonia* of scholarly

Now it might be objected that in his treatment of the *void* Aristotle argues repeatedly that the void cannot act as a cause of natural motion.²⁴ The implication, it could be argued, is that it should.²⁵ However, I think the actual structure of Aristotle's argumentation does not support such an interpretation. The arguments are primarily directed against the early atomists and arguably misleading. The early atomists apparently believed that the void was a necessary condition for motion to occur. Aristotle is taking this principle as his starting-point but reformulates it as the statement that place is a cause. He then turns the tables on his opponents by claiming that the void actually precludes natural motion and hence any kind of motion whatsoever. For he argues, rather oddly, that if there is no natural motion then there is no motion at all. He (illicitly) concludes that either there is no natural motion, or no void. (but, it may be added, there is natural motion; hence there is no void). Aristotle's argument is not convincing, perhaps even positively sophistical. The premiss that the void should be a determining cause of motion is made up by Aristotle himself—on the basis of the atomists' thesis that void is a necessary condition for motion—in order to refute his opponents. It should not, to my mind, be taken as implying that Aristotle himself thought that void *qua* place (or space) should act as a cause.

To my mind the issue is decided by an additional (though to my knowledge generally neglected) piece of evidence. There is the quite unambiguous testimony of Simplicius who introduces a fragment of Eudemus (in which it is explicitly denied that place is an *efficient* cause) with the statement that Eudemus took it as agreed among all (*homologoumenon*) that place has no causal status.²⁶ This would be an

interpretations of the phrase at *Cael.* Δ 310b34-35. For some different interpretations see Ross, *Aristotle's Physics*, Oxford 1955, 563 (natural place is like form in that it exhibits an attractive influence, 'just as form which matter is destined to assume has attractive influence on the matter'); P.K. Machamer, 'Aristotle on Natural Place and Natural Motion', *Isis* 69 (1978), 377-87, esp. 380 (it is not that natural place is a form, but rather that an element attains its proper form when it is in a natural or organic unity with its like); D.J. Furley, 'Aristotle and the Atomists on Motion in a Void', in: P.K. Machamer / R.G. Turnbull, (eds.), *Motion and Time, Space and Matter; Interrelations in the History of Philosophy and Science*, Ohio 1976, 83-100, esp. 93 and note 46 (place is not a cause in any of the four traditional categories, though it is a *factor* in the formal cause which is in its turn the *logos* or *eidos* of the primary bodies. Hence it is not a *cause*, but rather a *necessary condition* of natural motion). Clearly further study of the role of natural place in the explanation of natural motion in Aristotle and the Aristotelian tradition would seem to be rewarding.

²⁴ *Phys.* Δ 214b12 ff.; 214b28 ff.; 215a6 ff.

²⁵ Cf. Sorabji, *Matter, Space, Motion*, 142-3, 186.

²⁶ Cf. Simplicius. In *Phys.* p. 532.33 ff., esp. 533.14-17 on Eudemus (= Eudemus fr. 75 Wehrli): διὸ καὶ ὁ Εὐδήμος ἐν τρίτῳ τῶν Φυσικῶν παρακολουθῶν τοῖς ἐνταῦθα λεγομένοις καὶ ὡς ὁμολογούμενον ἕκαστον τῶν αἰτίων ἀφαιρῶν τοῦ τόπου κτλ. From the quotation which follows, a polemical passage in which the atomists are attacked, we may infer that Eudemus nevertheless followed Aristotle in assuming that place had a certain δύναμις and that it was in some sense κινητικόν. Apparently, however, for Eudemus this did not imply that place was invested with *causal* power.

odd thing to say for an early Peripatetic who did not notably dissent from Aristotle's theory of place, if Aristotle himself had in fact not subscribed to this 'common conviction'.

We had best assume, therefore, that according to Aristotle the *dunamis* with which (natural) place is commonly credited is not to be equated with any causal power. Rather, the statement that place has a *dunamis* appears to boil down to nothing more than the thesis that, just as place is a necessary condition of motion,²⁷ natural place is a necessary condition of natural motion and hence that the concept of natural place allows meaningful talk about natural motion.²⁸

If then there appears to be little reason to assume that Aristotle was committed to a truly dynamic conception of natural place, there is equally little reason to assume that it was merely this dynamic character of natural place which Theophrastus wanted to attack by substituting the *nature* of the elements as the real causal factor.²⁹ We may note, in addition, that even if this *were* the case Theophrastus would not have had to change the whole outlook of Aristotelian place by introducing the idea of order and position. He could in that case just as well have stuck to Aristotle's own concept of place as the surface of the surrounding body while adding the rider

²⁷ On *topos* as a necessary condition of motion see *Phys.* Γ 200b20 and *Cael.* A 275b17 ff.

²⁸ Here we may compare the final part of the dialectical discussion of *topos*, where Aristotle—quite in conformity with the programmatic statement quoted above, note 2—sets out to show that his own concept of place fits in well with the common conceptions about place (212a22-30) and where he argues that it allows us to solve the *aporai* (212b22 ff.). In this context he also reverts to the phenomenon of natural motion and natural place with the following words (*Phys.* Δ 212b29-213a1): Καὶ φέρεται δὴ εἰς τὸν αὐτοῦ τόπον ἕκαστον εὐλόγως· ὃ γὰρ ἐφεξῆς καὶ ἀπτόμενον μὴ βία, συγγενές· καὶ συμπεφυκότα μὲν ἀπαθῆ, ἀπτόμενα δὲ παθητικὰ καὶ ποιητικὰ ἀλλήλων. Καὶ μένει δὴ φύσει πᾶν ἐν τῷ οἰκείῳ τόπῳ ἕκαστον οὐκ ἀλόγως· καὶ γὰρ τὸ μέρος τόδε ἐν ὅλῳ τῷ τόπῳ ὡς διαιρετὸν μέρος πρὸς ὅλον ἐστίν, οἷον ὅταν ὕδατος κινήσῃ τις μῶριον ἢ ἀέρος. We need not go into the details of this rather difficult passage. It is sufficient for our present purpose to note that (1) natural motion is here primarily explained in terms of *things* (i.e. elements) acting on each other, *not* in terms of anything like a causal power of place, and (2) the text seems to indicate that Aristotle intends to show that his own particular concept of place, insofar as it defines place as the limit of the surrounding body, best tallies with this explanation of natural motion because natural motion is also in some way or other caused by the surrounding body. In other words, the idea is that his concept of place, in contradistinction to, e.g., the isotropic space-void of the early atomists, allows meaningful talk about natural places (note the use of the terms εὐλόγως and οὐκ ἀλόγως), because, although inert, it is not isotropic. For it *does* make a difference to what kind of body the surrounding surface actually belongs.

²⁹ Note that Theophrastus' talk about natural motion being determined by the φύσεις of the elements at issue does not appear to differ substantially from Aristotle's habitual description of natural motion (see e.g. *Cael.* A 276b4-5: φέρεσθαι πέφυκε, and 278b30-32 which speaks of the οἰκείοι τόποι of some elements in connection with the way they move κατὰ φύσιν).

that this surface *as such* is fully inert and that natural motion is caused by the *phuseis* and *dunameis* of the bodies themselves. That, instead, Theophrastus fr. 22 contains a more radically different conception of (natural) place indicates a more general dissatisfaction on Theophrastus' part with the ontology and morphology of Aristotelian place.

This suggestion becomes even stronger when it is realized that in this fragment Theophrastus extends the idea of place to the parts of non-homogeneous substances. True, in his biological works Aristotle too repeatedly makes use of the idea of the parts of animals and plants having a proper and natural position. However, in the only technical discussion of place, in *Phys. Δ*, he argues that such parts are normally speaking not in a place of their own.³⁰ The reason is obvious. In such cases the continuity of the parts precludes our conceiving of the place of these parts in the Aristotelian fashion, i.e. as a surrounding surface. Accordingly, Theophrastus' explicit statement that we also speak of place in these cases (*legetai ... homoiōs de kai epi tōn ... anomoiomerōn*) may be interpreted as another polemical stab, showing that this alternative conception of place can also account for the common idea that the parts of a body have a place of their own, and that it thus saves more *phainomena* than the conception of place which emerged from Aristotle's discussion in *Phys. Δ*.

We may conclude that the two conceptions opposed in fr. 22 are conceptions of place in general, not merely of *natural* place. Insofar as this fragment also offers a conception of natural place different from Aristotle's, the evidence appears to indicate that it is primarily the *morphology* of Aristotelian natural place, rather than any alleged *dynamic character*, that Theophrastus is objecting to.

III. FR. 22 AND THE PROBLEM OF THEOPHRASTUS' COMMITMENT

Thus far our story may be regarded as a reasoned defence of the interpretation put forward—albeit *ex cathedra*—by scholars such as Jammer and Sambursky. It

³⁰ Cf. *Phys. Δ* 211a29: ὅταν μὲν οὖν μὴ διηρημένον ᾖ τὸ περιέχον ἀλλὰ συνεχές, οὐχ ὡς ἐν τόπῳ λέγεται ἐν ἐκείνῳ, ἀλλ' ὡς μέρος ἐν ὅλῳ and 211b1: ἔτι ὅταν μὴ διηρημένον ᾖ, ὡς μέρος ἐν ὅλῳ λέγεται, οἷον ἐν τῷ ὀφθαλμῷ ἡ ὄψις ἢ ἐν τῷ σώματι ἡ χεὶρ κτλ. At 212b3 Aristotle explicitly (ὥσπερ δ' ἐλέχθη) refers back to this distinction by his statement that 'some things are in place potentially, others actually'. It is not entirely clear when Aristotle thinks this potentiality is actualized. It is perhaps most plausible to suppose that he thought that when, e.g., a hand starts waving, and hence starts moving on its own, it gets a place properly speaking. Alternatively, he may have thought that these parts are only in a place if they are actually separated from the body to which they belong. The former possibility seems to be suggested at 211a17 ff. where the parts of a body are also said to 'move accidentally', i.e., by being involved in the motion of the body as a whole and to be 'capable of moving, on their own': Ἔστι δὲ κινούμενον τὸ μὲν καθ' αὐτὸ ἐνεργεία, τὸ δὲ κατὰ συμβεβηκός· τοῦ δὲ κατὰ συμβεβηκός τὸ μὲν ἐνδεχόμενον κινεῖσθαι καθ' αὐτό, οἷον τὰ μόρια τοῦ σώματος καὶ ὁ ἐν τῷ πλοίῳ ἦλος κτλ.

remains to be decided, however, to what extent Theophrastus was himself actually committed to the alternative conception of place outlined in fr. 22. With regard to this question scholars have reached various conclusions. Jammer and Sambursky do not express any doubts and plainly assert that fr. 22 contains the outlines of an alternative theory of place defended by Theophrastus *in propria persona*.³¹ Also Duhem and Sorabji, however their interpretations may in other respects differ from those of Jammer and Sambursky, appear to assume that fr. 22 represents Theophrastus' own positive views, viz. his alternative conception of natural place.³² More reservations were expressed by Zeller and Regenbogen, who regarded the contents of fr. 22 as a cautious suggestion on Theophrastus' part.³³ An even more sceptical stand has been taken by David Sedley who, in a footnote to a study on Philoponus' concept of space, points out that Simplicius claims that Aristotle's theory of place was shared by the 'whole Peripatos'. Sedley thinks 'the whole Peripatos' should include at least Eudemus and Theophrastus. Accordingly he regards the *aporiai* of fr. 21 and fr. 22 as 'merely exploratory'.³⁴

In the present section I want to argue that the position taken by Zeller and Regenbogen is in the light of our (scanty) evidence the most plausible one. To this purpose I shall first discuss the question of the meaning of Simplicius' words *hōs en aporiai proagōn ton logon*. Next, I shall discuss the implications of Simplicius' statement about 'Aristotle and the whole Peripatos' sharing one and the same conception of place.

It is perhaps tempting to take the phrase by which Simplicius introduces Theophrastus fr. 22, *hōs en aporiai proagōn ton logon*, as an indication that we are here dealing with an *aporia* of the same kind as those of fr. 21, viz. an *objection*. This indeed seems to be the way in which both Sorabji and Sedley interpreted

³¹ Jammer, *Concepts of Space*, 21: 'Theophrastus ... comes to the conclusion that space is no entity in itself but only an ordering relation that holds between bodies and determines their relative positions'; Sambursky, *Concept of Place in Late Neoplatonism*, 12: 'For Theophrastus place is not a reality in itself, but is defined by the juxtaposition and coexistence of bodies and their parts'.

³² Duhem, *Système du monde*, 350: 'Théophraste modifie la définition du lieu naturel de telle sorte qu'elle ne suppose pas l'éclaircissement préalable de la notion du lieu'; Sorabji, *Matter, Space, Motion*, 204, concludes, in spite of his deference to Sedley's more sceptical approach, that it is plausible that Theophrastus put forward the suggestion of fr. 22 'not as a puzzle to be refuted, but as something deserving serious consideration'.

³³ E. Zeller and R. Mondolfo, *La filosofia dei greci nel suo sviluppo storico*, parte ii, vol. 5 (a cura di A. Plebe), Firenze 1966, 372: 'Teofrasto *tendeva*, per parte sua, a ricondurre il concetto di spazio all'ordine' [my italics]; and *ibid.* note 110: 'Teofrasto dice, *anche se in modo di dubbio* ...' [again my italics]. O. Regenbogen, *RE* art. 'Theophrastus', 1549, speaks of fr. 22 as containing Theophrastus' 'eigene, vorsichtig wie gewöhnlich, vorgelegene Auffassung'.

³⁴ D.N. Sedley, 'Philoponus' Conception of Space', in R. Sorabji (ed.), *Philoponus and the Rejection of Aristotelian Science*, Ithaca, NY, 1987, 140, note 1.

Simplicius' words.³⁵ Of course the term *aporia* (as well as the verb *aporein*) is often used to denote a particular puzzle, or a particular objection. However, it should be recalled that the word may also bear what seems to be the more basic connotation of 'the mental state of being unable to decide between two or more conflicting views'.³⁶ I would suggest taking the word *aporia* in Simplicius' introductory phrase in the latter sense, particularly because Simplicius speaks of *en aporaii proagōn ton logon*, thus implying that it is Theophrastus' *logos* which is in a state of *aporia*. Accordingly, we may translate Simplicius' introductory phrase as: 'continuing his account in an aporetic fashion' (the implication being that Theophrastus is unable or unwilling to draw any definite conclusions), rather than 'as raising a puzzle' or 'continuing his account in the form of a puzzle' (in which case the implication would be that we are dealing with just one more specific puzzle or objection). In that case the upshot of these introductory words is that Theophrastus confronted Aristotle's theory as a whole (as well as the *aporaii* it involved) with hardly more than his own cautious suggestion (place as a relation, not as an entity in its own right), although the first word of the actual quotation (*mēpote*) may be taken to suggest that he tends to favour the proposed alternative. Students of Theophrastus, especially those of the so-called 'metaphysical fragment', are familiar with this unobtrusive mode of presentation. In general Theophrastus appears to have refrained from claiming definite truths.³⁷

We may next turn to the second problem which is of relevance to our attempts to determine the extent of Theophrastus' commitment to the contents of fr. 22, viz. the curious juxtaposition in Simplicius' *Corollarium* of the claim that Aristotle's conception of place was shared by *the whole Peripatos* (viz. in the initial diæresis, at *In Phys.* p. 601.20),³⁸ and the claim, made with respect to fr. 22, that Theophrastus

³⁵ Sorabji, *Matter, Space, Motion*, 202, speaks of 'Theophrastus' second fragment, in which he switches from raising difficulties for Aristotle's definition of place to raising difficulties which may be taken to concern his idea of *natural* place'. Sedley, 'Philoponus' Conception of Space', 140, note 1, speaks of both fr. 21 and fr. 22 as 'Theophrastus' *aporaii*—puzzles—about Aristotelian place'.

³⁶ Cf. Arist. *Top.* 145b1: ἡ ἀπορία ἰσότης ἐναντίων λογισμῶν. And *ibid.* 145b16-20: ὁμοίως δὲ καὶ τῆς ἀπορίας δόξειεν ἂν ποιητικὸν εἶναι ἢ τῶν ἐναντίων ἰσότης λογισμῶν· ὅταν γὰρ ἐπ' ἀμφοτέρω λογισμομένοις ἡμῖν ὁμοίως ἅπαντα φαίνεται καθ' ἐκάτερον γίνεσθαι, ἀποροῦμεν ὁπότερον πράξωμεν. For a similar use of ἀπορεῖν in Simplicius, cf. *In Cat.* p. 118.9-10 ἀπορεῖ μήποτε ... καὶ λύει τὴν ἀπορίαν.

³⁷ He characteristically inserts words like ἰσως (*caute adseverantis*, as the index verborum in Ross's edition of Theophrastus' *Metaphysics* comments); see also Regenbogen, *RE* art. 'Theophrastus', 1552 (Theophrastus' 'methodische Vorsicht'), 1556 (Theophrastus' 'skeptische Vorsicht, die im Ganzen doch wohl das Grundelement seines Denkens ausmacht').

³⁸ At the beginning of the *Corollarium* Simplicius professes that he will add some contributions of his own to the articulation (*diarthrōsis*) of the possible views of place, since in this respect Aristotle's contributions (especially his fourfold diæresis of the possible conceptions of place to be found at *Phys.* Δ 211b5 ff.) are a bit outdated, if only because

to some extent foreshadowed Damascius' relational theory of place (viz. in the final part of the *Corollarium*, at *In Phys.* p. 639.13-15 and 642.17-18). How should these apparently incompatible claims be weighed against each other?

We may recall, to begin with, that Simplicius, perhaps *via* his master Damascius, did have first hand knowledge of Theophrastus' *Physics*. In fact, he is our main witness for it, providing a number of direct quotations and numerous paraphrases.³⁹ We should not therefore too easily dispose of his words when in what he himself regards as the final and most important diaeresis of all possible conceptions of place, he claims, on the basis of our fr. 22, that Theophrastus suggested a concept of place more like Damascius' than like Aristotle's. Neither should we forget that elsewhere (i.e. in our fr. 21) Simplicius exclusively records Theophrastus' *doubts* about Aristotle's conception of place and that he *nowhere* implies that Theophrastus positively tried to defend Aristotle in this respect, whereas he does refer to such attempts on the part of Eudemus and Alexander.

At the same time, it seems significant that Simplicius does not provide more evidence for Theophrastus' heretical view: he merely comes up with a single quotation (and a rather diaporematic one at that), and there is no suggestion that he could have added numerous parallel passages. It seems a fair guess that there was nothing more to be quoted as evidence. This plausibly explains the absence of the name Theophrastus from Simplicius' initial diaeresis of the different theories of place. In the eyes of Simplicius, apparently, Theophrastus' un-Aristotelian suggestion of fr. 22 was not enough to make him deserve a separate label in the initial diaeresis.⁴⁰ And it is obvious that it is a separate label that would have been required if Simplicius

interesting new views have been defended by later philosophers. He then provides a more refined initial diaeresis (*In Phys.* p. 601.14-25), which divides theories of place as follows. Some argued that it was (A) corporeal (*sōma*; only Proclus), others that it was (B) incorporeal. Among the latter class there were those who considered it (B1) unextended. This group can be further divided, for some thought (B1a) that unextended place was merely a substrate (*hupokeimenon*; example: Plato), whereas others assumed (B1b) that it had some effective power (*telesiourgos*; example: Damascius). Those who (B2) thought of place as extended endowed it either (B2a) with two dimensions (example: Aristotle 'and the whole Peripatos'), or (B2b) with three dimensions. The latter group in turn should be divided into (B2b-α) those who admitted empty space or void (examples: Democritus *cum suis*, Epicurus), and (B2b-β) those who did not (examples: the more famous among the Platonists, and Strato).

³⁹ Note, moreover, that the author of the commentary on the *De Anima*, which bears Simplicius' name (Simplicius, *In De An.*, p. 136.29) claims to have written an *epitomé* of Theophrastus' *Physics*. Good arguments against the attribution of this commentary to Simplicius (rather than to Priscianus Lydus) have been provided by F. Boissier and C. Steel, 'Priscianus Lydus en de 'in de Anima' van Pseudo (?) -Simplicius, *Tijdschrift voor Filosofie*, 34 (1972), 761-822. See also I. Hadot, *Le problème du néoplatonisme Alexandrin; Hiérocles et Simplicius*, Paris 1978, 194-202. However, even if the commentary is to be attributed to Priscianus Lydus, who was a pupil of Damascius as well, the passage referred to testifies to the fact that in the philosophical circles in which Simplicius was active Theophrastus' *Physics* was still read and commented upon.

⁴⁰ Note that also in the final part of the *Corollarium* he only speaks of Theophrastus

had wanted to include Theophrastus' name there. He could not—as he did in the final diaeresis—simply append Theophrastus' name to the view ascribed to Damascius. For whereas in the final diaeresis the *differentia specifica* distinguishing Damascius' conception from that of others is merely what we might call its *morphology* (i.e. the fact that Damascius defines place in terms of *taxis* and *thesis*, in which respect Theophrastus, to judge from fr. 22, may indeed count as his precursor), the initial diaeresis rather stresses the *dynamic character* as the *proprium* of Damascian place;⁴¹ and this dynamic character is precisely what Theophrastus appears to have denied to place in fr. 22.

We may conclude therefore that whereas we cannot explain away Theophrastus' figuring as a heterodox Aristotelian in the final part of Simplicius' *Corollarium*, the absence of his name from the initial diaeresis is in the light of the contents of fr. 22 not too surprising. Hence, if the claims (1) that Aristotle's conception of place was shared by the whole Peripatos (initial diaeresis of the *Corollarium*) and (2) that insofar as his conception of place is concerned Theophrastus should be grouped with Damascius rather than with Aristotle (final part of the *Corollarium*) contradict each other and, hence, cannot both be taken at face value, it clearly seems to be (1) which should be taken *cum grano salis* (note, incidentally that (1) is inexact anyway, Strato figuring as a prominent counterexample in the same diaeresis). We had best take the rather cavalier 'the whole Peripatos' as primarily meant to refer to 'orthodox Aristotelians' like Eudemus and Alexander of Aphrodisias, whose attempts to rescue Aristotle's concept of place are referred to elsewhere in Simplicius' commentary.

The picture of Theophrastus' attitude towards Aristotle's conception of place and of his commitment to the contents of fr. 22 which now emerges is this. Theophrastus criticized Aristotle's theory for good reasons. However, he did not confront this theory with a fully worked out alternative. His heterodoxy, in other words, consisted merely in his leaving the *aporiai* of fr. 21 unanswered, while presenting our fr. 22 as hardly more than a good *suggestion*. It is perhaps for this reason that his ideas about place did not become widely known.

IV. SIMPLICIUS ON THE CONNECTION THEOPHRASTUS-IAMBLICHUS-DAMASCIUS

If, according to the reconstruction of the previous section, Simplicius appears to be justified in presenting Theophrastus as having suggested a different view of *topos* than Aristotle, it may still be asked whether he is drawing a fair picture in claiming that the conception of place suggested in fr. 22 resembles those propounded

as a *witness* to the more elaborate theory of his own teacher Damascius (on which see the next section).

⁴¹ On the structure of Simplicius' initial diaeresis see above, note 38.

by Iamblichus and Damascius. Some further inquiry into the role which Simplicius assigns to Theophrastus' ideas about place in his historical survey at the end of the *Corollarium* indeed seems appropriate. For a better understanding of the context in which fr. 22 is preserved may help us to place the fragment itself in a proper perspective.

The juxtaposition of Theophrastus and Iamblichus⁴² is at first glance rather odd. Although we cannot here go into the details of Iamblichus' theory of place as a whole, we may note that according to Simplicius it is essential to Iamblichus' conception of place that place is *active*, and that it should be connected with cause (*aitia*) and emanation (*dēmiourgia*).⁴³ As we noted, this dynamic character of place seems to be precisely what is denied to place in fr. 22 which according to Simplicius should reveal the resemblance between Theophrastus and Iamblichus. Moreover, Simplicius adds that insofar as Iamblichus' place 'fills' bodies (*sumplēroi ta sōmata*) it is naturally united with them and not separable.⁴⁴ That also the latter feature is rather un-Theophrastean can be inferred from the fact that Theophrastus is alleged to have stressed the required immobility of place,⁴⁵ which would indeed be hard to square with the conception of place as united with what is in place.

Should we then conclude that we are dealing with a misinterpretation—or at least with an *interpretatio neoplatonica*—of Theophrastus on Simplicius' part? In that case Theophrastus' use of the terms like *kata tas phuseis kai kata tas dunameis* may have triggered off associations with Iamblichus' claim that place is 'naturally united' (*sumphuēs*) with the body and that it is a power (*dunamis*).⁴⁶ I would argue, however, that the overall layout of the final part of Simplicius' *Corollarium* rather suggests that Simplicius found a more superficial and harmless connection

⁴² Simpl., *In Phys.* p. 639.22-3 (immediately following on Theophrastus fr. 22): τὸ δὲ αὐτὸ δεῖξω τὸν θεῖον Ἰάμβλῖχον μαρτυρόμενον.

⁴³ Cf. Simpl., *In Phys.* p. 639.31ff. where in support of his own thesis Iamblichus adduces the τοῦ Τιμαίου προαίρεσις, ἥτις αἰεὶ τῇ δημιουργίᾳ τὴν φύσιν συνάπτει ... and where he professes that ἔδει ... καὶ τὸν τόπον ἡρτημένον ἀπὸ τῆς αἰτίας κατιδεῖν. For a good survey of Iamblichus' conception of place see Sorabji, *Matter, Space, Motion*, 204-6.

⁴⁴ Simpl., *In Phys.* p. 640.9-11. For further references concerning Iamblichus' theory of place see Sorabji, *Matter, Space, Motion*, 205-6.

⁴⁵ Simpl., *In Phys.* p. 583.10 (= Eudemus fr. 79b Wehrli, not in Wimmer), 606.33 (= fr. 22b Wimmer = Eudemus fr. 79a Wehrli); 612.5 (not in Wimmer).

⁴⁶ Though Sorabji does not explicitly speak of a misinterpretation on Simplicius' part, he does so implicitly by saying (*Matter, Space, Motion*, 204) that 'Simplicius claims that the Neoplatonist Iamblichus takes the same view of place as Theophrastus', while adding that 'the point of comparison is that Iamblichus makes a thing's place united with it (*sumphuēs*), rather than external (*exōthen*), just as Theophrastus says that things have a place dictated to them by nature (*phusis*, conn. *sumphuēs*), which is not merely accidental to them'. He remarks that this comparison 'overlooks a very big difference: Iamblichus restores to place the independent reality of which Theophrastus had drained it' (*ibid.*), and that 'it is a tenuous connection that Simplicius finds between the two philosophers' (*op. cit.*, 207).

between Theophrastus and Iamblichus. It is to this overall layout, therefore, that we shall now turn.

Fr. 22 is appended to an elaborate defence by Simplicius of the theory of place which was developed by his master Damascius.⁴⁷ The exposition of Damascius' theory itself constitutes the climax of the whole *Corollarium*: it is the theory to which Simplicius himself adheres—albeit with some minor changes—and which he professes to be the most complete formulation of the common conception (*koinē ennoia*) of place.⁴⁸ According to Simplicius this common conception is that place is 'the determination (*aphorismos*) of the position of those things that are separated'. In order to show how Damascius' theory was adumbrated—and the *koinē ennoia* partially accounted for—by the several theories of place discussed in the *Corollarium* Simplicius sets out his final diaeresis which is basically threefold. It says that an *aphorismos* can be spoken of either (1) as a receptacle (*kata tēn hupodochēn*), or (2) as a surrounder (*kata tēn periochēn*), or (3) 'according to each thing's order and position relative to others' (*kata tēn hekastou pros ta alla taxin tēs theseōs*).⁴⁹ Simplicius adds that all these *aphorismoi* may concern either corporeal or incorporeal being.

Applying this diaeresis to views about the *aphorismos* of *bodies*—i.e. to conceptions of *physical* place—Simplicius argues that some thinkers (1) stuck to the receptacle view, whereas others (2) adhered to the idea that place was a surrounder. The latter class is in its turn divided into those (2a) who identified place with the form *qua* surface (*kata tēn epiphaneian eidos*, i.e. the *visible* form), treating it as united with the body, whereas others (2b) treated it as an *external* surrounder (*exōthen*) which could be either (2b-1) a surrounding limit (the view of Aristotle, he adds), or (2b-2) an external three-dimensional extension. Finally there is (3), the conception of place as having to do with order and position (*taxis kai thesis*) relative to other things. This, he adds, amounts to the conception he has just outlined, which was defended by Damascius and also attested in the works of Theophrastus and Iamblichus.⁵⁰

⁴⁷ For a very useful survey of the contents of the *Corollarium de loco* in general and of the part dealing with Damascius in particular, see P. Hoffmann. 'Simplicius: Corollarium de Loco' in: *L'astronomie dans l'antiquité classique*; Actes du Colloque tenu à l'université de Toulouse-Le Mirail, Octobre 1977, Paris 1979, 143-61.

⁴⁸ Simpl., *In Phys.* p. 640.15 ff.: [...] ἡ μᾶλλον ἐκάστω τῶν περὶ τόπου τι γραψάντων παρακολουθοῦντες δεῖξωμεν μηδένα μὲν τῆς περὶ τόπου διαμαρτεῖν ἀληθείας, πολυειδοῦς δὲ ὄντος αὐτοῦ ἄλλον κατ' ἄλλο τι τῶν εἰδῶν τοῦ τόπου θεάσασθαι τε καὶ ἐκφῆναι. ἵνα τοίνυν καὶ τὴν κοινὴν ἔννοιαν περὶ τόπου παντὸς ἰδεῖν δυνηθῶμεν καὶ τὰς ὑπὸ τῶν φιλοσόφων εἰρημένας διαφορὰς ὑπ' αὐτὴν θεασώμεθα, λέγομεν ἀρχὴν τινα πάλιν λαβόντες τοιάνδε. [...]]

⁴⁹ Simpl., *In Phys.* p. 641.23 ff.: Νῦν δὲ προσκείσθω τοῖς εἰρημένους, ὅτι κοινὴ τις ἂν εἴη πόπου παντὸς ἔννοια ἢ λέγουσα ἀφορισμὸν αὐτὸν εἶναι τῆς ἐκάστου τῶν ἐν τοῖς οὐσι διακεκριμένων θέσεως. ὁ δὲ ἀφορισμὸς (1) ὁ μὲν κατὰ τὴν ὑποδοχὴν ἐστίν, (2) ὁ δὲ κατὰ τὴν περιοχὴν, (3) ὁ δὲ κατὰ τὴν ἐκάστου πρὸς τὰ ἄλλα τάξιν τῆς θέσεως. [...]]

⁵⁰ Simpl., *In Phys.* p. 642.14-18: [...] κατὰ δὲ τὴν ἐκάστου πρὸς τὰ ἄλλα τάξιν

The relation here sketched between Theophrastus, Iamblichus and Damascius, in other words, is that Damascius may count as the main representative of the 'order and relation' view of place, Theophrastus and Iamblichus being adduced as additional witnesses. As Simplicius puts it, the Damascian version of (3) is 'neither fully new, nor completely neglected by the famous philosophers',⁵¹ although he is only too quick to point out that his teacher was the first one who worked out the view that place has to do with 'positioning' (*euthetismon*) in a really satisfactory way.⁵² Thus it is being implied that the views of Theophrastus, Iamblichus and Damascius are similar in some respects, while differing in others. Fortunately both the way in which Simplicius arranges his final diaeresis and the information he provides about these three thinkers allow us to infer with a fair degree of plausibility *to what extent* their views were similar and *in which respects* they were different.

As to the similarities, Simplicius twice unambiguously states that Theophrastus, Iamblichus and Simplicius belong together insofar as they all defined place 'according to each thing's order and position relative to others'.⁵³ Other features, such as the dynamic or non-dynamic character of place, apparently play no role. This fits in perfectly with the overall character of Simplicius' final diaeresis, which offers a classification of conceptions of place according to their *morphological* features. The question, e.g., of whether place is inert or dynamic—which plays a prominent role elsewhere in the *Corollarium*⁵⁴—is not touched upon here. Thus also the group of philosophers defending the conception of place as a three-dimensional *diastēma* is presented as if it were homogeneous.⁵⁵ The criterion for

τῆς θέσεως ὡς ἀσώματον μὲν, αἰσθητὸν δέ, καὶ ἐν σώμασιν τὸν τόπον ὁ προσεχῶς ἀποδεδомένος λόγος ἀφορίζεσθαι μοι δοκεῖ, ὃν εἶπον Δαμασκίου τοῦ ἡμετέρου καθηγεμόνος καὶ ὑπὸ τοῦ Θεοφράστου καὶ τοῦ θείου Ἰαμβλίου μαρτυρουμένον.

⁵¹ Simpl., *In Phys.* p. 639.12: ὅτι μὴ πάντα καινοπρεπὴς ἐστὶ μηδὲ τοῖς κλεινοῖς τῶν φιλοσόφων ἀγνοηθεῖσα βούλομαι δεῖξαι.

⁵² Cf. Simpl., *In Phys.* p. 644.10: Δαμάσκιος ὁ ἡμέτερος ἦψατο μὲν καλῶς τοῦ κατὰ τὸν εὐθητισμὸν τόπου καὶ διήρθρωσε γε αὐτὸν πρῶτος ὧν ἡμεῖς ἴσμεν.

⁵³ Simpl., *In Phys.* p. 641.27 and 642.14: κατὰ δὲ τὴν ἐκάστου πρὸς τὰ ἄλλα τάξιν τῆς θέσεως.

⁵⁴ Thus, in the elaborate classification at *In Phys.* p. 601.15 ff., for example, we find a distinction being made, among those thinkers who considered place to be without dimensions (ἀδιάστατον), between those who considered it as nothing but a receptacle, like Plato, and others who, like Damascius, considered it to have effective power (τελεσιουργός). A similar distinction between dynamic and non-dynamic conceptions of place is to be found at 618.6, on which see the next footnote.

⁵⁵ Contrast *In Phys.* p. 618.6 ff., where, after having discussed the views of Aristotle and Proclus, Simplicius adds a subdivision of those thinkers who conceived place as an incorporeal three-dimensional extension (in fact he only speaks of τῶν διάστημα τὸν τόπον ἀσώματον λεγόντων, but the only conception of place as *two-dimensional*, viz. that of Aristotle *cum suis*, has by then already been discussed). In that connection he distinguishes between those who treated this extension as just 'absence of body' (κατ' ἀπουσίαν ... τοῦ σώματος) and as just room for body (χωρητικὸν σωμάτων) on the one hand, and others who credited it with a φύσις, while regarding it as something ontologically superior to bodies

treating them as one and the same class, in other words, is merely the fact that they all, so to speak, made place *look the same way*. Hence we may plausibly infer that also the common ground between the views of Iamblichus, Theophrastus and Damascius is merely that they were committed to roughly the same morphology of place.

As to Theophrastus, the opening lines of fr. 22 seem to support this contention. As to Iamblichus, matters are somewhat more complicated, but here also Simplicius' presentation can be plausibly defended. In the first place Iamblichus' theory cannot be classed among those who either thought of place as a *hupodochē* or as a *periochē*. If it were objected that Iamblichus' place looks very much like form in that it plays an active role in keeping bodies together, so that it might seem to be a candidate for the second group (*eidos* being a kind of *periochē*), the answer should be that form *qua* *periochē* (i.e. the *eidos* which is spoken of in connection with part of group (2) of the diaeresis) is not the qualitative and constitutive form, but rather the outer and visible form (*to kata tēn epiphaneian eidos*). Insofar as Iamblichus' place has the function of keeping the parts of individual bodies together it may well be described as dealing with 'order and position' (viz. with the right order and position of the parts).

This brings us to the differences. To us it is quite obvious that Iamblichus and Damascius thought of place as active, whereas Theophrastus did not. We need not suppose, however, that Simplicius (or his teacher Damascius) overlooked this difference. As we noted, it is just not the kind of difference which he deems relevant in his final division. But there is more. We already referred to Simplicius' claim that—even insofar as the mere morphology of place is concerned—Damascius was the first to deal with the order-and-relation view in a really satisfactory way (*hēpsato kalōs*) and to apply the necessary distinctions (*diēthrōse prōtos*).⁵⁶ Now at least one of the distinctions which Damascius made in this connection happens to be amply attested in Simplicius' *Corollarium*, viz. his distinction between an *idios topos* and a *topos en platei* (or *koinos topos*, or *topos exōthen*).

According to Damascius, a thing's *idios topos* is the natural and fixed order and position of its parts. This place of course is inseparable and moves along with the thing of which it is the 'proper' place. The other kind of place, the 'broad place' (*topos en platei*), is defined as the order and relation between the body at issue and its surroundings (or even the cosmos as a whole). It is this latter kind of place which meets the common requirement of separability and immobility. It is this kind of place which is more easily discernible (*prophanestera*) and which, according to Damascius induced the Peripatetics to speak of places only in the case of mobile substances.⁵⁷

and having form (εἶδος) on the other hand. Of the latter class, the defenders of a dynamic conception of place, Syrianus is mentioned as an example.

⁵⁶ See the text quoted above, note 52.

⁵⁷ Damascius *ap. Simplicius*. *In Phys.* p. 639.4-9.

Now whereas Damascius thus appears to have applied the idea of order and relation both to his *idios topos* and to his *koinos topos*, Theophrastus apparently concentrated on the notion of the *topos* of *x* being the order and relation *between x and its surroundings* (whether *x* be a substance or a part of a substance), which amounts to Damascius' conception of *koinos topos*. Iamblichus, on the other hand, concentrated on the notion of the place of *x* being the order and relation *of the parts of x*, which amounts to Damascius' conception of *idios topos*. In other words, Theophrastus and Iamblichus each prefigured Damascius in a different respect. Hence even the conclusion that the common ground between the conceptions of place of Damascius, Iamblichus and Theophrastus only concerns the morphology of place is in need of further qualification. Though they all make use of the notion of 'order and position', they disagree as to the question of *what* place is the order and position.

All this shows that when, having expounded Damascius' theory of place, Simplicius introduces Theophrastus fr. 22 with the words 'also Theophrastus appears to have had that conception of place' (*tēn ennoian tautēn ... peri topou*),⁵⁸ and when directly after fr. 22 he adds 'I shall show that the divine Iamblichus is a witness to that very view' (*to de auto deixō marturomenon*), there is no need to suppose that Simplicius means to suggest that Theophrastus' conception of place is *in all respects* identical to Damascius', or that Iamblichus takes the same view of place as Theophrastus.⁵⁹ The general idea in this final section of the *Corollarium* seems to be rather that Theophrastus and Iamblichus may count as precursors of Damascius insofar (and only insofar) as certain aspects of the *morphology* of place are concerned.

As a final point we may note that this conclusion shows that Simplicius also regarded Theophrastus fr. 22 as suggesting an alternative *morphology* of place *tout court* (rather than an alternative *dynamics* of *natural* place). This again supports the interpretation of fr. 22 put forward above.

V. CONCLUSIONS

We may now draw some threads together. We have concentrated on different aspects of Theophrastus fr. 21 and 22. It appeared that, from a systematical point of view, both could very well be explained as a reaction against Aristotle's 'reified' conception of place, fr. 21 pointing to a number of difficulties that would follow from such a conception, fr. 22 suggesting a relational conception of place as a

⁵⁸ Note that at *In Phys.* p. 642.21 Simplicius also refers to the view held by Damascius and (to some extent) by Theophrastus and Iamblichus as ταύτην τὴν ἔννοιαν, and that he there makes it quite clear that this ἔννοια concerns (hardly more than) the idea of place being defined κατὰ δὲ τὴν ἐκάστου πρὸς τὰ ἄλλα τάξιν τῆς θέσεως (p. 642.14; see also above, note 50).

⁵⁹ The latter thesis can be found in Sorabji, *Matter, Space, Motion*, 204.

plausible alternative (Section I). This charitable interpretation is not contradicted by the evidence itself. Contrary to what has been supposed by others, we could find no indications that fr. 22 merely deals with *natural* place, nor that it reacts to an allegedly Aristotelian theory of dynamic natural place (Section II). Moreover our interpretation appears to be supported by the way in which Simplicius arranges his material and presents Theophrastus' position in the final part of his *Corollarium de loco* (Section IV). Still it must be admitted that the first sentence of fr. 22, as well as the way it is introduced by Simplicius, point to an originally diaporematic context: Theophrastus probably did not go beyond a mere suggestion (Section III). All this results in the following picture of the place of Theophrastus in the *Rezeptionsgeschichte* of (this aspect of) Aristotelian physics.

As Sorabji rightly underscores, the doubts concerning Aristotelian place, first collected in Theophrastus fr. 21, proved to be seminal, although we need not suppose that later critics were directly influenced by Theophrastus. Indeed, Aristotle himself provided enough ammunition, for example, by failing to answer the question of the ontological status of place,⁶⁰ by failing to provide a more technical account of immobility,⁶¹ and by attacking the most obvious rival view (place as a three-dimensional extension) with very unsatisfactory arguments.

Interestingly, at least a number of the problems signalled by Theophrastus were apparently also treated by Eudemus in his discussion of Aristotle's conception of place.⁶² We know, for instance, that Eudemus tried to give a coherent account of the immobility of place (Theophrastus' second *aporia*) along Aristotelian lines.⁶³ Concerning the problem of the displacement of the outer sphere (Theophrastus' third and fourth *aporia*) he tried to defend the idea that the outer sphere is in a place in one sense (viz. insofar as its parts are in a place) while not being in a place in another sense (viz. insofar as there is nothing outside it).⁶⁴ On the basis of Eudemus fr. 73 Wehrli we may perhaps even infer that Eudemus was aware

⁶⁰ Cf. *Phys.* Δ 209a2 ff. where it is said that it is unclear what place is (*ti estin*) and that we must find out its *genos*. See also Aristotle's programmatic statement at *Phys.* Δ 211a7 ff. quoted above, note 22. However, these questions are not answered in any really explicit and satisfactory way, the final definition of place as 'the first unmoved boundary of the surrounding body' raising more problems than it solves. This was also the opinion of Simplicius, as may appear from his words at *In Phys.* p. 600.13 ff.

⁶¹ On Aristotle's rather untechnical notion of immobility see above, note 10.

⁶² We may safely assume that there was an exchange of ideas between the two of them, though in the present case it is hard to say who influenced whom. It is perhaps likeliest that the doubts put forward by Theophrastus induced Eudemus to work out and refine some aspects of Aristotle's theory. On the correspondence between Eudemus (in Rhodes) and Theophrastus (in Athens) on the text of Aristotle's *Physics* see Simpl., *In Phys.* p. 801.13 ff. (= Eudemus fr. 6 Wehrli).

⁶³ Eudemus *ap.* Simpl., *In Phys.* p. 595.6-9 (= fr. 80 Wehrli), a text also discussed above, note 10.

⁶⁴ Eudemus *ap.* Simpl., *In Phys.* p. 595.8-15 (= fr. 80 Wehrli).

of the problem of the ontological status of place. For here he argues that one of the inherent difficulties of the subject consists in the fact that place escapes us once the emplaced body is taken (or thought) away. Place cannot be conceived in its own right, but merely together with something else (presumably, the substances which are in place), just as consonants can only be conceived (or, only occur) in combination with vowels.⁶⁵ Admittedly, as our description shows, it is not quite clear whether Eudemus focuses on the possibility or impossibility of our having a *conception* of place in its own right or on the possibility or impossibility of place itself *being* something in its own right. We should note, however, that on an Aristotelian line of thought the idea that we cannot *think of* place in its own right would certainly imply that place cannot *exist* in its own right. Hence also Eudemus, just like Theophrastus in fr. 22, appears to have doubted whether place is a *kath' heautēn ousia*.

Eudemus nevertheless kept much closer to Aristotle's own theory in sticking to the conception of place as a surrounding surface. If we are right in supposing that he defended a non-reified version of this conception of place-as-a-surface, we may note that he had a lot to explain. In fact the only really satisfactory solution along these lines was the 'nominalist' one proposed by Ockham in the later Middle Ages.⁶⁶ However, given the overall realism of classical Aristotelianism it is difficult to imagine that in this respect Eudemus prefigured Ockham.

Theophrastus' solution, however hesitantly put forward, appears to be far superior from a systematic point of view. It might even be claimed that it transforms Aristotle's (and Eudemus') rather naive theory of *place* (focusing on the location of individual substances) into what we might call a theory of *space* (in principle

⁶⁵ Eudemus *ap. Simpl., In Phys.* p. 523.22 ff. (= fr. 73 Wehrli): ὁ δὲ Εὐδημος τῆς δυσκολίας τοῦ περὶ τόπου προβλήματος καὶ τοῦτο αἴτιον εἶναί φησι τὸ μὴ ῥάδιον εἶναι ἐπιλαβέσθαι τοῦ τόπου, διότι ὑποφεύγει πάντως ἐξαιρουμένου τοῦ ἐν τόπῳ σώματος, καὶ καθ' αὐτὸ μὲν οὐκ ἔστιν αὐτὸν νοῆσαι, εἴπερ δὲ ἄρα, μεθ' ἑτέρου, ὥσπερ τοὺς τῶν ἀφώνων καλουμένους φθόγγους· κατὰ γὰρ τοῦ α ὁ τοῦ β καὶ ὁ τοῦ γ δῆλος.

⁶⁶ In his treatment of the much discussed problem of the place of a body in a flowing medium, e.g. a boat in a river (cf. Aristotle's example at *Phys.* Δ 212a16 ff.), Ockham took over the distinction, already made by Aquinas and others (for names and references see Grant, 'Medieval Doctrine of Place', 63, notes 20 and 21) between *material place* (in the case of a boat in a river: the ever different surrounding surfaces of the water) and *formal place* (this surrounding surface taken as immobile in virtue of the introduction of the concept of fixed distances to, e.g., the outer sphere of the heavens or the poles). Next, he defined formal place (which alone combines the Aristotelian requirements of contiguity and immobility) as the successive material surfaces *considered as immobile* or *considered as if they were materially immobile*. Cf. P. Boehner (ed.), *Tractatus de successivis Attributed to William Ockham, edited with a Study on the Life and Works of Ockham*, New York 1944, 87: '... Philosophus intendit dicere, quod locus est immobilis per aequivalentiam, hoc est quod tantum valet locus ad salvandum omnia, quae ponuntur de loco, ac si realiter esset immobilis, quia ita possunt in eodem loco succedere sibi diversa corpora loco non mutato, sicut possent, si locus esset immobilis.'

allowing an account of the sum total of spatial relations within the cosmos).⁶⁷ In a way, viz. insofar as it still defines the place of a thing in terms of its surroundings rather than in terms of a *diastēma* (whether in the Platonic or in the atomist sense), his new conception of place may therefore be regarded as constituting a sensible elaboration rather than a complete rejection of the Aristotelian position. Unlike the alternative proposed by Strato it could in principle be taken over *ceteris paribus*, leaving the rest of the system of Aristotelian physics intact.

That this novel conception of place did not have a wider appeal and that we have to wait for Damascius to take up Theophrastus' suggestion, is probably partly due to the fact that Theophrastus omitted to elaborate his point and that, as a consequence, it did not become widely known. Moreover, the relational conception of place suggested by Theophrastus, if worked out properly, was much more technical and much farther removed from everyday usage and ordinary experience than its contemporary rivals. We need only look at Aristotle's theory of *topos* and the way in which it was taken seriously in antiquity (and beyond) to see to what extent lack of technicality and closeness to common thinking and speaking were commonly counted as virtues.⁶⁸

⁶⁷ On this use of the denominations 'place' and 'space' see my *Concepts of Space in Classical and Hellenistic Greek Philosophy*, 13-18.

⁶⁸ I would like to thank the participants of the 5th International Theophrastus Conference, in particular Richard Sorabji and David Sedley, for their useful and stimulating comments on the paper I read there. I am also grateful to Jaap Mansfeld and Mark Howard who suggested a number of stylistic improvements.

8

The *Meteorology* of Theophrastus in Syriac and Arabic Translation

Hans Daiber

I.	Introduction	166
II.	Conspectus siglorum et nominum	167
III.	Theophrastus' <i>Meteorology</i> in Syriac Transmission	170
	The Syriac Fragment in the Cambridge University Library, ms. Gg.2.14 (= Syc)	176
	Syriac Excerpts in Moses Bar Kepha, <i>Hexaemeron</i> , ms. Paris 241 (= Sym)	188
IV.	The Syro-Arabic Translation by Bar Bahlūl	199
V.	The Syro-Arabic Translation by Ibn al-Khammār	218
VI.	Edition and English Translation of Theophrastus' <i>Meteorology</i> , Arabic version by Ibn al-Khammār	225
VII.	The Importance of Theophrastus' <i>Meteorology</i> . Some conclusions	282

I. INTRODUCTION

Recent research has increasingly brought to light the importance of Theophrastus (371-287 B.C.) for the history and development of Aristotelian thought.¹ This is certainly true in regard to natural science and the particular subject of meteorology. In 1918, Gotthelf Bergsträsser² awakened scholarly interest by publishing the Syriac-Arabic version of Theophrastus' *Meteorology*, translated and abbreviated by Bar

¹ On the state of research see Hellmut Flashar (ed.), *Die Philosophie der Antike 3* (= *Ältere Akademie—Aristoteles—Peripatos*), Basel/Stuttgart 1983 (= *Grundriss der Geschichte der Philosophie*, völlig neu bearb. Aufl.), p. 474-522. —Information concerning new editions of single works which replace the old edition by F. Wimmer (Paris 1866; repr. Frankfurt/M. 1964) can be found on p. 475. —For the most recent research see now the collection of articles in: *Theophrastus of Eresus On His Life and Work*. Ed. by William W. Fortenbaugh together with Pamela M. Huby and Anthony A. Long. New Brunswick (U.S.A.) and Oxford (U.K.) 1985 (= *RUSCH II*); *Theophrastean Studies On Natural Science, Physics and Metaphysics, Ethics, Religion, and Rhetoric*. Ed. by W.W.Fortenbaugh and Robert W. Sharples. 1988 (= *RUSCH III*).

² For bibliographical details see the conspectus siglorum et nominum.

Bahlül. Soon afterwards the studies of Erich Reitzenstein, 1924, and Hans Strohm, 1937 and 1953, succeeded in challenging the prejudice of Eduard Zeller³, who had held that Theophrastus did not contribute anything new to his master Aristotle. The results of Reitzenstein and Strohm were subsequently confirmed, modified, and supplemented by the discovery of a Syriac fragment by Hendrik Joan Drossaart Lulofs, who in 1955 published some pieces of the Syriac text in English translation and gave a first evaluation of the fragment. Nine years later, in 1964, Ewald Wagner and Peter Steinmetz published an edition of the Syriac text together with a German translation and comments. This text formed the basis for the discussion of Theophrastus' *Meteorology* in Steinmetz's meritorious monograph *Die Physik des Theophrast* published in the same year. However, his study suffered from the fact that the oriental tradition of the *Meteorology*, the Syriac version as well as the Syriac-Arabic translation by Bar Bahlül, was incomplete. Moreover, Bergsträsser's edition of the Arabic text of Bar Bahlül's version was limited to a single manuscript that contained many mistakes. Better evidence was needed and happily provided by the discovery of a complete and carefully done Syriac-Arabic translation, presumably by the Nestorian Ibn al-Khammār in the 10th century, in several manuscripts. That discovery has enabled us to prepare a critical edition of a complete version and to compare it with both the Syriac fragment and the shortened version of Bar Bahlül. Since comparison revealed the importance of including new editions of the Syriac fragment and of Bar Bahlül's text, both of which profit from the new manuscript material, we have included here all the material as a basis for the reconstruction of Theophrastus' *Meteorology*. It is hoped that this results in an improved understanding of Theophrastus' work—one that significantly modifies the results of earlier scholars and supplements Otto Gilbert's often obsolete reference-book *Die meteorologischen Theorien des griechischen Altertums*⁴.

II. CONSPECTUS SIGLORUM ET NOMINUM

Syriac translation:

Syc Syriac fragment, preserved in the Cambridge University Library, ms. Gg.2.14, fol.351a-353b; copied around 1400 A.D. Edited with German translation by E. WAGNER and P. STEINMETZ, *Der syrische Auszug der Meteorologie des Theophrast*. Wiesbaden 1964. = Akademie der Wissenschaften und der Literatur. Abhandlungen der geistes- u. sozialwissenschaftlichen Kl., Jahrgang 1964, nr. 1.

³ *Die Philosophie der Griechen in ihrer geschichtlichen Entwicklung*. II/2 (3rd ed. 1879; 4th ed. Leipzig 1921, repr. Darmstadt 1963) p. 806ff., esp. 813ff.

⁴ Leipzig 1907; reprinted Hildesheim 1967.

168 Theophrastus

Sym Syriac excerpts in Moses Bar Kepha, *Hexaameron*, ms. Paris 251 (copied 1504 A.D.). German translation in L. SCHLIMME (= *Schl.*), *Der Hexaameronkommentar des Moses Bar Kepha*. Wiesbaden 1977.

Schl. SCHLIMME: see *Sym.*

Syro-Arabic translation by Bar Bahlūl:

He Bar Bahlūl, *Kitāb ad-Dalāʾil*, ms. Hekimoğlu (Istanbul) 572, p. 308-23; copied 556/1161. Facsimile edition by F. SEZGIN, Frankfurt 1985.

As Bar Bahlūl, *Kitāb ad-Dalāʾil*, excerpt in ms. Aşir Efendi I 1164, fol. 88v-93r; copied 850/1446-7. Edited, with German translation by G. BERGSTRÄSSER (= *Be*), *Neue meteorologische Fragmente des Theophrast, arabisch und deutsch*. Heidelberg 1918.

Be G. BERGSTRÄSSER: see *As*.

Ba Bar Bahlūl.

Syro-Arabic translation by Ibn al-Khammār:

H Hyderabad (India), Andhra Pradesh Government Oriental Manuscripts Library and Research Institute, ms. Arab. nr. 371 (= *Falsafa* 63), fol.309r-314r; copied 1023/1614.

A Aligarh (India), University collection nr. 119 (= fol.1r-5r); copied in the 11-12/17-18th centuries.

R Rampur (India), Raza Library nr. 2906, fol.61r-77r; copied in the 13/19th century. Facsimile edition by F. SEZGIN in: *Zeitschrift für Geschichte der arabisch-islamischen Wissenschaften* 1, Frankfurt/M. 1984, Arabic section p. 9-16.

Syro-Arabic translation by Ibn al-Khammār, fragment ascribed to Avicenna, with the title *Risāla fī dhikr asbāb ar-raʿd*:

B British Museum (London), add.16.659, fol.363v-364v; copied 1182/1768.

S Salar Jung (Hyderabad, India), *falsafa* nr. 42/3 (= fol.246v-247v); copied 1245/1829.

Ra Rampur (India), Raza Library nr. 1789, fol.9r-11v; copied 1256/1840.

Ru	Rampur (India), Raza Library nr. 541, fol.514v-518v; copied 1291/1874.
Hy	edition published in Hyderabad 1353/1934, p. 2-6.
Kha	Ibn al-Khammār
() or []:	not in the original text; additions in the English translation.
{ }	additions by the Arabic/Syriac translator/transmitter; to be omitted.
< >	to be added.
+	addit/addunt.
-	omittit/omittunt.
lac.	lacuna.
inc.	incipit
Ar	Arabic translation.

Abbreviations used in the commentary on the English translation of
Theophrastus' *Meteorology*

Abbreviations of ancient authors and titles mostly follow H.G. LIDDELL/R. SCOTT, *A Greek-English Lexicon*. Revised and augmented throughout by H. St. JONES with the assistance of R. McKENZIE. Oxford 1973.

Further abbreviations:

S	sources of Theophrastus
Th	parallels, references in Theophrastus' works
I	influence, echo of Theophrastus' <i>Meteorology</i> in later works
L	modern literature on Theophrastus' <i>Meteorology</i>
Aetius	Aetius, <i>Placita philosophorum</i> , ascribed to Plutarch, ed. H. Diels, <i>Doxographi graeci</i> , Berolini 1879 (repr. 1958), p. 267-444.
Dr.L.	Drossaart Lulofs, H.J.: 'The Syriac translation of Theophrastus' <i>Meteorology</i> .' —In: <i>Autour d'Aristote. Recueil d'études de philosophie</i>

170 Theophrastus

ancienne et médiévale offert à Monseigneur A.Mansion. Louvain 1955
(= Bibliothèque philosophique de Louvain 16), p.433-49.

RE Pauly-Wissowa. Paulys Real-Encyclopädie der classischen Altertumswissenschaft. Neue Bearbeitung begonnen von G. Wissowa, fortgeführt v. W. Kroll u. K. Mittelhaus. Stuttgart 1894ff.

Reitzenstein = Reitzenstein, Erich: *Theophrast bei Epikur und Lucrez.* Heidelberg 1924. = Orient und Antike 2.

St. Steinmetz, Peter: *Die Physik des Theophrastos von Eresos.* Bad Homburg V.D.H., Berlin, Zürich 1964. = Palingenesia 1.

Strohm

Theophrast = Hans Strohm, 'Theophrast und Poseidonios.' - In: *Hermes* 81, Wiesbaden 1953, p. 278-95.

Zur Meteorologie = Strohm, 'Zur Meteorologie des Theophrast.' - In: *Philologus* 92, Leipzig 1937, p. 249-68; 403-28.

Th Theophrastus

W.St. Wagner, Ewald and Steinmetz, P.: see above Syc.

III. THEOPHRASTUS' METEOROLOGY IN SYRIAC TRANSMISSION

In addition to the publication of Bar Bahlūl's shortened Syriac-Arabic translation of Theophrastus' *Meteorology* by G. Bergsträsser in 1918, we now have a complete Syriac-Arabic translation apparently done by Ibn al-Khammār⁵, a contemporary of Bar Bahlūl. This translation seems to have been carefully done and is certainly of use for reexamining the Syriac text published by Wagner in 1964 according to a fragment preserved in the Syriac manuscript Cambridge University Library Gg.2.14 (fol. 351a-353a), an old ms. dating from around 1400⁶. The result of such a reexamination is remarkable: the Syriac fragment agrees much more with the version of Ibn al-Khammār than with that by Bar Bahlūl. As the Arabo-Syriac apparatus shows, all lacunas of the Syriac ms. can be supplemented by the Arabic translation of Ibn al-Khammār; at the same time the transmitted Arabic text can be corrected and supplemented in several cases from the Syriac as preserved in

⁵ See section V.

⁶ Cf. the description of the ms. in H.J. Drossaart Lulofs, *Nicolaus Damascenus on the Philosophy of Aristotle.* Leiden 1969 (= Philosophia antiqua XIII), p. 45ff.

the Cambridge ms.⁷ and as preserved in the Arabic translation by Bar Bahlūl⁸.

A word for word comparison with the Arabic translation enables us to evaluate the Syriac ms.: besides many lacunas caused by severe damage to the ms., the Syriac copyist omitted the titles of the chapters, although it is possible that they may have been added by the Arabic translator as they are also missing in Bar Bahlūl's translation. More serious is the omission of whole sentences and passages. Finally, the value of the Syriac ms. is affected by mistakes of the copyist⁹; he omitted single words¹⁰ and in one case¹¹ we found a dittography from 351a10-11. Occasionally the careless handwriting of the copyist makes it difficult to determine the correct reading of individual words. The editor of the Syriac, E. Wagner, has done much work in producing a readable Syriac text; however, a new comparison of his edition with the Syriac ms. reveals numerous shortcomings and wrong readings, and this has affected the German translation which also suffers from misinterpretations caused by the fragmentary character of the Syriac ms.

As we have found extensive excerpts in another Syriac work, the *Hexaemeron* by the Nestorian Moses Bar Kepha (c. 813-903), the Syriac ms. could be corrected and supplemented¹² in several places. A new edition of the Syriac including the excerpts in Moses Bar Kepha was necessary. However, a complete reconstruction of the Syriac on the basis of Moses Bar Kepha was not possible, for his excerpts are not always literal and he sometimes paraphrases the text, adding information from other sources and observations of his own. Nevertheless, his text is extremely valuable for the reconstruction of the Syriac and for a critical evaluation of the Arabic translations by Ibn al-Khammār and Bar Bahlūl. As the Syriac original of the *Hexaemeron* is still unpublished, we have edited these excerpts from the Syriac ms. Paris 241 (copied 1504 A.D.) and where necessary compared them with ms. Paris 311 (copied 1434 A.D.).

Moses Bar Kepha included the excerpts from Theophrastus without naming his source. They form part of his cosmological proof of God's existence from His creation. A generally reliable German version of these excerpts can be found in the translation of Lorenz Schlimme (= Sym). We refer to this translation in giving a complete survey of Moses' excerpts from Theophrastus' *Meteorology*:

⁷ Cf. e.g. Kha 6,4.31f.38.61.73; 7,6; 9,3 and 13,21.

⁸ See Kha 13,12.

⁹ Cf. e.g. Syc 351a4; 351b9.

¹⁰ Cf. e.g. Syc 351b19 and 22.

¹¹ Syc 351a8.

¹² Moses Bar Kepha contains excerpts from chapters 13,14 and 15 which are missing in the Syriac ms. of Theophrastus' *Meteorology*.

172 Theophrastus

Ibn al-Khammār Arabic translation	Syriac translation ms. Cambridge Gg.2.14	Bar Kepha, Syriac ms. Paris 241	Schlimme, German translation of Bar Kepha
ch.1,4-5	351a4	184r a3-5	V 16,22-24
ch.1,9-11	351a7-9	184r a6-13	V 16,25-30
ch.1,12-14	351a9-11	184r a19-22	V 16,34-39
ch.1,15-17	351a11-13	184r a13-18 a. 184r a22-30	V 16,31-33 V 16,40-44
ch.1,18-20	351a13-15	183v b5-15	V 16,2-9
ch.1,21-23	351a15-17	183v b25-184r a3	V 16,16-22
ch.2,2-5	351a27-29	cf. 184v a6-15	V 17,12-17
ch.2,9-12	351a32-351b1	184v a 15-19	V 17,18-23
ch.3,1-6	351b6-10	184v b18-185r a1	V 18,1-12
ch.4,2-5	351b10-12	185r a3-13	V 19,2-10
ch.5,1-8	351b13-19	185r a21-185r b21	V 20,4-23
ch.6,2-26	351b19-352a4	cf. 195v a13-196r a7	V 36,7-43
ch.6,36-41	352a15-20	cf. 196r a16-29	V 36,49-58
ch.6,57-91	352b3-28	cf. 196r b12-196v b3	V 36,68-105
ch.7,9-27	352b34-353a15	cf. 180v a6-b8	V 5 (compl.)
ch.9,3-4	353a20-21	cf. 182v a4-11	V 9,20-23
ch.9,4-8	353a21-23	182r b27-182v a3	V 9,14-19
ch.9,8-11	353a24-26	182r b19-26	V 9,10-14
ch.13,43-54	—	194v a20-b25	V 34 (compl.)
ch. 14,1-11	—	194v b30-195r a15	V 35,3-14
ch.15,2-9	—	191r b12-v a14	V 32,1-29
ch.15,9-11	—	192v a13-17	V 32,113-116

The Syriac excerpts of Theophrastus' *Meteorology* in Moses Bar Kepha are extremely important for an evaluation of the Syriac translation. They not only confirm the general reliability of the Syriac translation as preserved in Ibn al-Khammār's Arabic version but also enable us to obtain greater certainty concerning the correct Arabic reading wherever the Syriac ms. is incomplete and the Arabic transmission not uniform¹³ or even incorrect. Such is the case in Kha 4,4 where the Syriac of Moses Bar Kepha suggests correcting *aw* in all Arabic mss. to read *wa-lā*. However, it remains uncertain whether this mistake is based on an Arabic archetype or on the Syriac *Vorlage*. As we find the mistake even in Bar Bahlūl's version (Ba 4,4), it may be a mistake of the Syriac text used by Ibn al-Khammār and Bar Bahlūl. As this would be the only example of a common mistake, it does not permit any generalisations.

¹³ Cf. e.g. Kha 4,3.

The Syriac excerpts in the *Hexaemeron* enable us to date the Syriac translation: Moses Bar Kepha was born in 813 A.D. in Balad/Mesopotamia, became bishop of Mosul, Beth Raman and Beth Kiyonāyā in 863 A.D., and died in 903 A.D. Thus, the excerpts in his *Hexaemeron* provide a terminus ante quem for the Syriac translation: it was already available during the 2nd half of the 9th century. This date can be confirmed by the fact that Moses also used another meteorological text, a compendium of Aristotle's *Meteorology* by the famous Christian translator Ḥunayn Ibn Ishāq (803-73 A.D.)¹⁴, and that suggests the 2nd half of the 9th century as the date of composition of the *Hexaemeron*.

In addition, the date of the Syriac translation can be fixed more precisely by an echo of Theophrastus' *Meteorology* in another Syriac work, the encyclopaedia *Keṯhāḫa d'simāḫa*, *Book of Treasures*, by the Nestorian Job of Edessa, in Arabic sources also called Aiyūb ar-Ruhāwī (c. 769-835). The Syriac text of this work was published with English translation in 1935 by Alfonso Mingana¹⁵. A comparison of the meteorological sections shows the heavy indebtedness of Job to the *Meteorology* of Aristotle. However, as Mingana on several occasions remarked, the explanations are "not always similar". This may have been caused by Job's use of Greek sources which recent research¹⁶ has identified with an unknown Greek collection of *Problemata* and which was also used in the *Sirr al-Khalīka* ("Secret of the Creation") by Ps.-Apollonius, a Hermetic compilation from the early 9th century¹⁷. In addition, Job of Edessa may have been influenced by various ideas on natural philosophy developed by contemporary Muṭazilites, especially an-Nazzām¹⁸. Therefore Job's encyclopaedia is an interesting reflection of natural philosophy with many ideas betraying a diversity of written and oral sources. This diversity apparently prevented Job from keeping slavishly to one source. He used these sources critically and in a manner that exhibits independence¹⁹. It is, therefore, difficult to identify Job's sources with exactitude. Nevertheless, we can identify Theophrastus' *Meteorology* as an additional source of Job's *Book of Treasures*. We find echos of the Theophrastean work at least in the chapters "On thunder and

¹⁴ Edited with translation and commentary by H. Daiber, *Ein Kompendium der aristotelischen Meteorologie in der Fassung des Ḥunain Ibn Ishāq*, Amsterdam-Oxford 1975 = Verhandelingen der Koninklijke Nederlandse Akademie van Wetenschappen, afd. Letterkunde, nieuwe reeks 89. On the excerpts in Moses Bar Kepha see the synopsis in Daiber, *Aetius Arabus*, Wiesbaden 1980 (= Akademie der Wissenschaften und der Literatur. Veröffentlichungen der Orientalischen Kommission XXXIII), p. 882f.

¹⁵ *Encyclopaedia of Philosophical and Natural Sciences as Taught in Baghdad about A.D. 817 or Book of Treasures*. Cambridge 1935.

¹⁶ Cf. Ursula Weisser, *Das "Buch über das Geheimnis der Schöpfung" von Pseudo-Apollonius von Tyana*, Berlin-New York 1980 (= Ars medica 3.Abt., Bd.2), p. 55-63.

¹⁷ Cf. Daiber in: *Der Islam* 59, 1982, p. 328.

¹⁸ Cf. Bernhard Lewin, 'Job d'Edesse et son Livre des Trésors,' in: *Orientalia Suecana* 6, 1957, p. 21-30.

¹⁹ Cf. on this point also Weisser l.c. and index s.n. Aiyūb ar-Ruhāwī.

lightning"²⁰, "On the reason why lightning is seen with the eye before the ear hears the sound of the thunder"²¹ and "On the halo of the sun and the moon"²². These chapters do not quote the known Syriac *Meteorology* of Theophrastus literally, but they are undoubtedly based on it.

Considering Job's dates and the fact that his *Book of Treasures* was written before 828 or even around 817 as supposed by Mingana²³, we may conclude that Theophrastus' *Meteorology* already existed in Syriac at the beginning of the 9th century. As Job of Edessa is known as a translator of Greek (mainly medical) works into Syriac and Arabic²⁴, he may well have translated Theophrastus' *Meteorology* into Syriac. However, this cannot be proven. In compiling his *Book of Treasures* he may have used the Greek original of Theophrastus or a Syriac version by an unknown translator, perhaps a contemporary.

It may be worthwhile to look for further echos of Theophrastus' *Meteorology* in Syriac sources. Such an investigation indeed brings to light traces of Theophrastus in the *Hexaemeron*²⁵ by the Nestorian Emmanuel Bar Shahhāre (died 980)²⁶ and in the *Book of Treasures* (*Kethābā da-s'yame*)²⁷ by Severus (or Jacob) Bar Shakkū (died 1241 A.D.)²⁸. However, the source of both authors appears to be the *Hexaemeron* by Moses Bar Kepha²⁹, so that neither can contribute much to the reconstruction of the history of Theophrastus' Syriac *Meteorology*.

²⁰ Cf. the translation of Mingana, book V ch. 4, p. 204f. with Theophrastus Kha 1,18ff.; translation Mingana p. 205, 2nd section with Theophrastus Kha 1,21-23 and translation Mingana p. 205, 3d section with Theophrastus Kha 2,2-9.

²¹ Cf. translation Mingana book V ch. 5, p. 206, 1st section, line 9 (a tree being chopped) with Theophrastus Kha 5,4-8 (similar example: splitting of firewood).

²² Cf. translation Mingana book V ch. 10, p. 215, line 5-9 with Theophrastus Kha ch. 14.

²³ See his introduction p. XXIII ff.

²⁴ Cf. Mingana introduction p. XIX ff.; Anton Baumstark, *Geschichte der syrischen Literatur*, Bonn 1922, p. 230. —According to Ibn Abī Uṣaybi'a, *Uyūn al-anbā' fī ṭabakāt al-aṭibbā'* ed. August Müller I, Königsberg 1884 (repr. Westmead 1972) p. 170,29 f. he was a mediocre translator and improved only in an advanced age.

²⁵ Compare Memrā 5 in the Syriac ms. Berlin 61, fol. 48r = English translation in Erik Ten Napel, 'Influence of Greek Philosophy and Science in Emmanuel Bar Shahhāre's *Hexaemeron*' (in: *Orientalia christiana analecta* 221 [= III. *Symposium Syriacum* 1980], Roma 1983, p.109-118), p. 114, n. 27 with Theophrastus Kha 2,2-5.

²⁶ Cf. on him Baumstark l.c. p. 238.

²⁷ Cf. F. Nau, 'Notice sur le Livre des Trésors de Jacques de Bartela, évêque de Tagrit (in: *Journal asiatique* 9e série, 7, Paris 1896, p. 286-331), p. 321 f. (ms. Paris 316, fol.183v, on thunder and lightning) with Theophrastus Kha 2,2-5; Nau p. 325 (ms. Paris 316, fol.190r, on the halo round sun and moon) with Theophrastus Kha 14,1-11; Nau p. 326f. (ms. Paris 316, fol.190v on πρηστήρ and στροβίλος) with Theophrastus Kha 13,43-54; Nau p. 327 (ms. Paris 316 l.c. on κερωνός) with Theophrastus Kha 6,2-26.

²⁸ Cf. on him Baumstark l.c. p. 311.

²⁹ Cf. the corresponding parallels in Moses Bar Kepha as given in the synopsis of the excerpts above. —Already Jan Bakoš pointed to the dependence of Bar Shakkū on the

Similarly disappointing is the result of examining the Syriac ms. 346 (copied 1309) of Paris³⁰. In a chapter on winds (fol. 68r ult. ff.) it refers to Theophrastus' explanation of winds with a sideways movement but offers no literal excerpts³¹.

Finally we should mention an anonymous explanation of thunder and lightning in a Garshuni ms. copied about 1500 A.D.³² It paraphrases Theophrastus' *Meteorology* ch. 1, the 6th, 7th and 3rd explanations of thunder. The Arabic text (in Syriac letters) is not based on the known Arabic translations by Bar Bahlūl and Ibn al-Khammār, and in individual cases it retains the terminology of the Syriac. We may conclude therefore that the anonymous author used a Syriac original. As it is not a literal translation, it cannot contribute to the reconstruction of the Syriac original.

Hexaemeron by Bar Kepha and their deviation from the Aristotle-orientated meteorology in Barhebraeus' *Mnārat qudshe*: see his edition and French translation *Le Candélabre des sanctuaires*, in *Patrologia orientalis* 24,3 (= fasc. 118), Paris 1933 (repr. 1974), p. 601 f., n. 1.

³⁰ Described by F. Nau, 'La cosmographie au VII^e siècle chez les Syriens,' in: *Revue de l'orient chrétienne* 2.sér. 5 (15), Paris 1910, p. 225-54; a first analysis of the sources can be found in Schlimme p. 863 ff.

³¹ Cf. Theophrastus' *Meteorology* Kha ch. 13/Syriac text 353b22-24; the Arabic is incomplete here (cf. the English translation of Kha 13,21 n. 8).

³² See A. Mingana, *Catalogue of the Mingana Collection of Manuscripts I* (Syriac and Garshuni Manuscripts), Cambridge 1933, col. 479, ms. Mingana 234 A (fol. 1a).

The Syriac Fragment in the Cambridge University Library, ms. Gg.2.14 (= Syc)

Syc 351a .ᐱᑭᐱᐱᐱᐱᐱ 2 [...]ᐱ ᐱᐱᐱᐱᐱᐱ ᐱᐱ ᐱᐱᐱᐱᐱᐱ

L.

[illegible]

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אנא ונחלחלח תענא תענא . אא אא אנא

אא 33 אאאא אאאא אאאא אאאא אאאא

Syc 351b אאאא אאאא /אא אאאא אאאא אאאא אאאא

אאאא אאאא אאאא אאאא אאאא אאאא אאאא אאאא

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IV.

אאאא אאאא אאאא אאאא אאאא אאאא אאאא אאאא

אאאא אאאא אאאא אאאא אאאא אאאא אאאא אאאא

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 הַיָּמִים כְּמִיּוֹן כְּמִיּוֹן [כְּמִיּוֹן כְּמִיּוֹן] כְּמִיּוֹן
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 כְּמִיּוֹן כְּמִיּוֹן [כְּמִיּוֹן כְּמִיּוֹן] כְּמִיּוֹן כְּמִיּוֹן
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V.

מִיּוֹן כְּמִיּוֹן [כְּמִיּוֹן כְּמִיּוֹן] 14 כְּמִיּוֹן כְּמִיּוֹן
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 כְּמִיּוֹן כְּמִיּוֹן [כְּמִיּוֹן כְּמִיּוֹן] 17 כְּמִיּוֹן כְּמִיּוֹן
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 כְּמִיּוֹן כְּמִיּוֹן [כְּמִיּוֹן כְּמִיּוֹן] 19 כְּמִיּוֹן כְּמִיּוֹן

VI.

מִיּוֹן כְּמִיּוֹן [כְּמִיּוֹן כְּמִיּוֹן] כְּמִיּוֹן כְּמִיּוֹן
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၂၁ <.....> ကစ၍၂၀၁၈ ၂၂ (ဆ) နှစ် .၂၀၁၈ ခုနှစ် ဖက်
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 ၂၆ ကမ္ဘာ့ ကမ္ဘာ့ (၂၀၁၈) ၂၇ နှစ် ကမ္ဘာ့ကမ္ဘာ့
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 .ကမ္ဘာ့ ၂၀ နှစ် ကိစ္စ .ဆက်တိုက် နှစ် ကမ္ဘာ့

၁၁ ဆပုဒ်ကမ္ဘာ . ကိစ္စ နှစ်က နှစ်က ၂၇ ကမ္ဘာ နှစ်
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[illegible]

[illegible][illegible]

... [ܐܬܝܬܝܠܐ ܒܡܬܐ ܕܐܬܝܬܝܠܐ ܕܐܬܝܬܝܠܐ 7 ...] ܐܬܝܬܝܠܐ
 ܠܐ ܕܐܬܝܬܝܠܐ ܕܐܬܝܬܝܠܐ ܕܐܬܝܬܝܠܐ 8 [...] ܐܬܝܬܝܠܐ ܕܐܬܝܬܝܠܐ
 ܐܬܝܬܝܠܐ ܕܐܬܝܬܝܠܐ ܕܐܬܝܬܝܠܐ 9 [...] ܐܬܝܬܝܠܐ ܕܐܬܝܬܝܠܐ
 ܐܬܝܬܝܠܐ ܕܐܬܝܬܝܠܐ ܕܐܬܝܬܝܠܐ 10 [...] ܐܬܝܬܝܠܐ ܕܐܬܝܬܝܠܐ
 ܐܬܝܬܝܠܐ 11 [...] ܐܬܝܬܝܠܐ ܕܐܬܝܬܝܠܐ ܐܬܝܬܝܠܐ ܐܬܝܬܝܠܐ
 ܐܬܝܬܝܠܐ 12 [...] ܐܬܝܬܝܠܐ ܕܐܬܝܬܝܠܐ ܐܬܝܬܝܠܐ ܐܬܝܬܝܠܐ
 ܐܬܝܬܝܠܐ 13 [...] ܐܬܝܬܝܠܐ ܕܐܬܝܬܝܠܐ ܐܬܝܬܝܠܐ ܐܬܝܬܝܠܐ
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 ܐܬܝܬܝܠܐ 15 [...] ܐܬܝܬܝܠܐ ܕܐܬܝܬܝܠܐ ܐܬܝܬܝܠܐ ܐܬܝܬܝܠܐ
 ܐܬܝܬܝܠܐ 16 [...] ܐܬܝܬܝܠܐ ܕܐܬܝܬܝܠܐ ܐܬܝܬܝܠܐ ܐܬܝܬܝܠܐ
 ܐܬܝܬܝܠܐ 17 [...] ܐܬܝܬܝܠܐ ܕܐܬܝܬܝܠܐ ܐܬܝܬܝܠܐ ܐܬܝܬܝܠܐ
 ܐܬܝܬܝܠܐ 18 [...] ܐܬܝܬܝܠܐ ܕܐܬܝܬܝܠܐ ܐܬܝܬܝܠܐ ܐܬܝܬܝܠܐ
 ܐܬܝܬܝܠܐ 19 [...] ܐܬܝܬܝܠܐ ܕܐܬܝܬܝܠܐ ܐܬܝܬܝܠܐ ܐܬܝܬܝܠܐ
 ܐܬܝܬܝܠܐ 20 [...] ܐܬܝܬܝܠܐ ܕܐܬܝܬܝܠܐ ܐܬܝܬܝܠܐ ܐܬܝܬܝܠܐ
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 ܐܬܝܬܝܠܐ 21 [...] ܐܬܝܬܝܠܐ ܕܐܬܝܬܝܠܐ ܐܬܝܬܝܠܐ ܐܬܝܬܝܠܐ
 ܐܬܝܬܝܠܐ 22 [...] ܐܬܝܬܝܠܐ ܕܐܬܝܬܝܠܐ ܐܬܝܬܝܠܐ ܐܬܝܬܝܠܐ
 ܐܬܝܬܝܠܐ 23 [...] ܐܬܝܬܝܠܐ ܕܐܬܝܬܝܠܐ ܐܬܝܬܝܠܐ ܐܬܝܬܝܠܐ

.לְהַחֲזִיק בַּמַּחְזֵק וּבַמַּחְזֵק
 כְּשֶׁהוּא בְּתוֹךְ הַמַּחְזֵק וְכֵן
 לְהַחֲזִיק בַּמַּחְזֵק 25 וְכֵן
 לְהַחֲזִיק בַּמַּחְזֵק 26 וְכֵן
 לְהַחֲזִיק בַּמַּחְזֵק 27 וְכֵן
 לְהַחֲזִיק בַּמַּחְזֵק 28

VII.

[כְּשֶׁהוּא בְּתוֹךְ הַמַּחְזֵק] וּבַמַּחְזֵק
 29 [וְכֵן] וְכֵן וְכֵן וְכֵן
 30 [וְכֵן] וְכֵן וְכֵן
 31 [וְכֵן] וְכֵן וְכֵן
 32 [וְכֵן] וְכֵן וְכֵן
 33 [וְכֵן] וְכֵן וְכֵן
 34 [וְכֵן] וְכֵן וְכֵן
 35 [וְכֵן] וְכֵן וְכֵן

26 [ᚱᚱᚱ ᚱᚱᚱ ᚱᚱᚱ] ᚱᚱᚱ ᚱᚱᚱ
 ᚱᚱᚱ ᚱᚱᚱ ᚱᚱᚱ

X.

27 בָּרוּךְ הוּא הַמַּמְשֵׁל בְּעוֹלָם הַבְּרִיָּה וְהַמַּמְשֵׁל בְּעוֹלָם הַמַּלְאָכִים [...] 28 מִיְּהוּדָה. וְהַמַּמְשֵׁל בְּעוֹלָם הַמַּלְאָכִים הוּא הַמַּמְשֵׁל בְּעוֹלָם הַבְּרִיָּה [...] 29 הַמַּמְשֵׁל בְּעוֹלָם הַמַּלְאָכִים הוּא הַמַּמְשֵׁל בְּעוֹלָם הַבְּרִיָּה [...] 30 אֲשֶׁר הוּא הַמַּמְשֵׁל בְּעוֹלָם הַמַּלְאָכִים הוּא הַמַּמְשֵׁל בְּעוֹלָם הַבְּרִיָּה [...] 31 [...] הַמַּמְשֵׁל בְּעוֹלָם הַמַּלְאָכִים הוּא הַמַּמְשֵׁל בְּעוֹלָם הַבְּרִיָּה #

XI.

[illegible]

XII.

¶[...] 7 [...] 6 [... 353b2-5]

XIII.

- 8 [...] ܐܠܐ [...] 9 [...] ܐܝ [...] ܐܠܐ [...] 10 [...] ܐܠܐ [...] ܐܠܐ
11 [...] ܐܠܐ [...] ܐܠܐ [...] 12 [...] ܐܠܐ [...] ܐܠܐ [...] 13 [...] ܐܠܐ
14 [...] ܐܠܐ [...] ܐܠܐ [...] 15 [...] ܐܠܐ [...] ܐܠܐ [...] 16 [...] ܐܠܐ
17 [...] ܐܠܐ [...] ܐܠܐ [...] 18 [...] ܐܠܐ [...] 19 [...] ܐܠܐ
20 [...] ܐܠܐ [...] ܐܠܐ [...] 21 [...] ܐܠܐ [...] ܐܠܐ [...] 22 [...] ܐܠܐ
23 [...] ܐܠܐ [...] ܐܠܐ [...] 24 [...] ܐܠܐ [...] ܐܠܐ [...] 25 [...] ܐܠܐ
26 [...] ܐܠܐ [...] ܐܠܐ [...] 27 [...] ܐܠܐ [...] ܐܠܐ [...] 28 [...] ܐܠܐ
29 [...] ܐܠܐ [...] ܐܠܐ [...] 30 [...] ܐܠܐ [...] ܐܠܐ [...] 31
32 [...] ܐܠܐ [...] ܐܠܐ [...] 33 [...] ܐܠܐ [...] ܐܠܐ [...] ܐܠܐ

לכאן וכו' 34 [בדף] וכן מפורש בכתב
והוא נראה. בזה, כד נראה. *

**Syriac Excerpts in Moses Bar Kepha, *Hexaemeron*,
ms. Paris (= sym).**

XIII.

Sym 194v Syriac paraphrase corresponding to Kha, Arabic text l. 43-54:
a20-b25
Schl.V 34

(sic) a20 a21 a22 a23 a24 a25 a26 a27 a28 a29 a30 b1 b2 b3 b4 b5 b6 b7 b8 b9 b10 b11

אֲדִיכָא מִשְׁמַר. b12 אֲדִיכָא מִלְּבָנָא בְּחִמָּא. b13 וְלִי
 מִלְּבָנָא בְּחִמָּא וְלִי b14 אֲדִיכָא מִלְּבָנָא בְּחִמָּא. b15 בְּחִמָּא
 אֲדִיכָא בְּחִמָּא b16 אֲדִיכָא בְּחִמָּא בְּחִמָּא b17 בְּחִמָּא
 אֲדִיכָא בְּחִמָּא b18 אֲדִיכָא בְּחִמָּא בְּחִמָּא b19 אֲדִיכָא
 אֲדִיכָא b20 אֲדִיכָא בְּחִמָּא. אֲדִיכָא בְּחִמָּא b21 אֲדִיכָא
 אֲדִיכָא b22 אֲדִיכָא בְּחִמָּא. אֲדִיכָא b23 אֲדִיכָא
 אֲדִיכָא b24 אֲדִיכָא בְּחִמָּא. אֲדִיכָא b25 אֲדִיכָא
 אֲדִיכָא.

XIV.

Sym 194v Syriac paraphrase corresponding to Kha, Arabic text I. 1-11:
 b30-195r
 a15/Schl.
 V 35,3-14

b30 אֲדִיכָא בְּחִמָּא בְּחִמָּא 195ra1 אֲדִיכָא בְּחִמָּא
 a2 אֲדִיכָא בְּחִמָּא אֲדִיכָא a3 אֲדִיכָא בְּחִמָּא
 a4 אֲדִיכָא בְּחִמָּא אֲדִיכָא a5 אֲדִיכָא בְּחִמָּא
 a6 אֲדִיכָא בְּחִמָּא אֲדִיכָא a7 אֲדִיכָא בְּחִמָּא
 אֲדִיכָא אֲדִיכָא אֲדִיכָא אֲדִיכָא אֲדִיכָא אֲדִיכָא
 אֲדִיכָא a8 אֲדִיכָא בְּחִמָּא אֲדִיכָא a9 אֲדִיכָא בְּחִמָּא
 a10 אֲדִיכָא בְּחִמָּא אֲדִיכָא a11 אֲדִיכָא בְּחִמָּא

a12 חסל מ ויתר א13 חסל מ א14 חסל מ
 חסל מ א15 חסל מ #

XV.

Sym 191r Syriac paraphrase corresponding to Kha, Arabic text I. 2-15:
 b12-191v
 a14/Schl.
 V 32,1-29

b12 חסל מ א13 חסל מ א14 חסל מ
 חסל מ א15 חסל מ {ח} חסל מ
 חסל מ א16 חסל מ א17 חסל מ
 חסל מ א18 חסל מ א19 חסל מ
 חסל מ א20 חסל מ א21 חסל מ
 חסל מ א22 חסל מ א23 חסל מ
 חסל מ א24 חסל מ א25 חסל מ
 חסל מ א26 חסל מ א27 חסל מ
 חסל מ א28 חסל מ א29 חסל מ
 חסל מ א30 חסל מ
 חסל מ א31 חסל מ
 חסל מ א32 חסל מ
 חסל מ א33 חסל מ
 חסל מ א34 חסל מ

[illegible]

Sym 192v Syriac paraphrase corresponding to Kha, Arabic text l. 9-11:
a13-17/Schl.
V 32,113-116

[illegible]

The Syriac fragments, Syriac apparatus

351a4 : እግረ ሰዓት / inc. Sym 184r a3/Schl. V 16,22
 : lac.Syc (at cf. Syc 351a11) :
 351a5 / finis Sym 184r a5 / Schl. V 16,24
 /correxī (cf. 351a13) :
 Sym - :
 351a7 :
 :
 (cf. Syc :
 / sive legendum :
 (cf. 351a13)? :

[illegible]

תַּחֲסִיחַ הַיָּמִים הַזֵּה הַזֶּה מִלְּפָנֶיךָ הַלֵּל. הַלֵּל הַזֶּה לְ
 תַּחֲסִיחַ 351a14 / inc. Sym 183v b5/Schl.V 16,2
 תַּחֲסִיחַ : אֶת הַלֵּל הַזֶּה / Sym תַּחֲסִיחַ : אֶת הַלֵּל הַזֶּה
 finis Sym : תַּחֲסִיחַ 351a15 / lac.Syc : Sym תַּחֲסִיחַ / lac.Syc
 /183v b15/Schl.V 16,9
 351a15-16 תַּחֲסִיחַ הַזֶּה הַזֶּה מִלְּפָנֶיךָ הַלֵּל : תַּחֲסִיחַ
 תַּחֲסִיחַ הַזֶּה הַזֶּה מִלְּפָנֶיךָ הַזֶּה מִלְּפָנֶיךָ הַזֶּה מִלְּפָנֶיךָ
 מִלְּפָנֶיךָ 351a16 / inc. Sym 183v b25 / Schl.V 16,16
 תַּחֲסִיחַ : אֶת הַלֵּל הַזֶּה / Sym תַּחֲסִיחַ : אֶת הַלֵּל הַזֶּה
 Sym : + תַּחֲסִיחַ / Sym : + תַּחֲסִיחַ הַזֶּה הַזֶּה הַזֶּה
 תַּחֲסִיחַ 351a17 / lac.Syc : Sym תַּחֲסִיחַ / Sym תַּחֲסִיחַ : תַּחֲסִיחַ
 תַּחֲסִיחַ 351a18 / finis Sym 183r a3 / Schl. V 16,22 : תַּחֲסִיחַ
 suppl Levi (v. Ar) : (post תַּחֲסִיחַ) 351a19 suppl Levi (v. Ar) : תַּחֲסִיחַ
 / suppl Levi (v. Ar) : תַּחֲסִיחַ 351a20
 351a27-29 תַּחֲסִיחַ הַזֶּה הַזֶּה מִלְּפָנֶיךָ ... תַּחֲסִיחַ : תַּחֲסִיחַ
 תַּחֲסִיחַ הַזֶּה הַזֶּה מִלְּפָנֶיךָ הַזֶּה מִלְּפָנֶיךָ הַזֶּה מִלְּפָנֶיךָ
 תַּחֲסִיחַ הַזֶּה הַזֶּה מִלְּפָנֶיךָ הַזֶּה מִלְּפָנֶיךָ הַזֶּה מִלְּפָנֶיךָ
 אֶת הַלֵּל הַזֶּה הַזֶּה מִלְּפָנֶיךָ הַזֶּה מִלְּפָנֶיךָ הַזֶּה מִלְּפָנֶיךָ
 תַּחֲסִיחַ 351a27-29 / Sym 184v a6-15/Schl.V 17,12-17
 351a32-33 תַּחֲסִיחַ הַזֶּה ... תַּחֲסִיחַ : תַּחֲסִיחַ הַזֶּה הַזֶּה
 inc.Sym 184v a15 תַּחֲסִיחַ הַזֶּה תַּחֲסִיחַ הַזֶּה תַּחֲסִיחַ הַזֶּה
 Sym 351a33 / Schl. V 17,18 תַּחֲסִיחַ : אֶת הַלֵּל הַזֶּה / Sym
 351b1 תַּחֲסִיחַ : אֶת הַלֵּל הַזֶּה / lac. Syc : Sym תַּחֲסִיחַ : אֶת הַלֵּל הַזֶּה
 / lac.Syc : אֶת הַלֵּל הַזֶּה / Sym תַּחֲסִיחַ : אֶת הַלֵּל הַזֶּה
 /finis Sym 184v a19 / Schl.V 17,23 תַּחֲסִיחַ הַזֶּה תַּחֲסִיחַ הַזֶּה
 351b6 [... תַּחֲסִיחַ] אֶת הַלֵּל הַזֶּה הַזֶּה מִלְּפָנֶיךָ : תַּחֲסִיחַ
 inc. Sym 184v b18/Schl.V 18,1 תַּחֲסִיחַ הַזֶּה תַּחֲסִיחַ הַזֶּה

[illegible]

: 16-351b / a26 -185r b11/Schl.V 20,8,17
Sym lac.: Sym 351b17 / Sym partim lac.Syc : Sym
Sym (ante) : Sym /correx
351b17-19 /Sym lac.: ...
finis Sym185r b21/Schl.V 20,23
351b19-352a4 :
Syc-) .
lac.
...
...

[illegible][illegible][illegible]

[illegible]

1966-1967-1968-1969-1970-1971-1972-1973-1974-1975-1976-1977-1978-1979-1980-1981-1982-1983-1984-1985-1986-1987-1988-1989-1990-1991-1992-1993-1994-1995-1996-1997-1998-1999-2000-2001-2002-2003-2004-2005-2006-2007-2008-2009-2010-2011-2012-2013-2014-2015-2016-2017-2018-2019-2020-2021-2022-2023-2024-2025-2026-2027-2028-2029-2030-2031-2032-2033-2034-2035-2036-2037-2038-2039-2040-2041-2042-2043-2044-2045-2046-2047-2048-2049-2050-2051-2052-2053-2054-2055-2056-2057-2058-2059-2060-2061-2062-2063-2064-2065-2066-2067-2068-2069-2070-2071-2072-2073-2074-2075-2076-2077-2078-2079-2080-2081-2082-2083-2084-2085-2086-2087-2088-2089-2090-2091-2092-2093-2094-2095-2096-2097-2098-2099-2100-2101-2102-2103-2104-2105-2106-2107-2108-2109-2110-2111-2112-2113-2114-2115-2116-2117-2118-2119-2120-2121-2122-2123-2124-2125-2126-2127-2128-2129-2130-2131-2132-2133-2134-2135-2136-2137-2138-2139-2140-2141-2142-2143-2144-2145-2146-2147-2148-2149-2150-2151-2152-2153-2154-2155-2156-2157-2158-2159-2160-2161-2162-2163-2164-2165-2166-2167-2168-2169-2170-2171-2172-2173-2174-2175-2176-2177-2178-2179-2180-2181-2182-2183-2184-2185-2186-2187-2188-2189-2190-2191-2192-2193-2194-2195-2196-2197-2198-2199-2200-2201-2202-2203-2204-2205-2206-2207-2208-2209-2210-2211-2212-2213-2214-2215-2216-2217-2218-2219-2220-2221-2222-2223-2224-2225-2226-2227-2228-2229-2230-2231-2232-2233-2234-2235-2236-2237-2238-2239-2240-2241-2242-2243-2244-2245-2246-2247-2248-2249-2250-2251-2252-2253-2254-2255-2256-2257-2258-2259-2260-2261-2262-2263-2264-2265-2266-2267-2268-2269-2270-2271-2272-2273-2274-2275-2276-2277-2278-2279-2280-2281-2282-2283-2284-2285-2286-2287-2288-2289-2290-2291-2292-2293-2294-2295-2296-2297-2298-2299-2300-2301-2302-2303-2304-2305-2306-2307-2308-2309-2310-2311-2312-2313-2314-2315-2316-2317-2318-2319-2320-2321-2322-2323-2324-2325-2326-2327-2328-2329-2330-2331-2332-2333-2334-2335-2336-2337-2338-2339-2340-2341-2342-2343-2344-2345-2346-2347-2348-2349-2350-2351-2352-2353-2354-2355-2356-2357-2358-2359-2360-2361-2362-2363-2364-2365-2366-2367-2368-2369-2370-2371-2372-2373-2374-2375-2376-2377-2378-2379-2380-2381-2382-2383-2384-2385-2386-2387-2388-2389-2390-2391-2392-2393-2394-2395-2396-2397-2398-2399-2400-2401-2402-2403-2404-2405-2406-2407-2408-2409-2410-2411-2412-2413-2414-2415-2416-2417-2418-2419-2420-2421-2422-2423-2424-2425-2426-2427-2428-2429-2430-2431-2432-2433-2434-2435-2436-2437-2438-2439-2440-2441-2442-2443-2444-2445-2446-2447-2448-2449-2450-2451-2452-2453-2454-2455-2456-2457-2458-2459-2460-2461-2462-2463-2464-2465-2466-2467-2468-2469-2470-2471-2472-2473-2474-2475-2476-2477-2478-2479-2480-2481-2482-2483-2484-2485-2486-2487-2488-2489-2490-2491-2492-2493-2494-2495-2496-2497-2498-2499-2500-2501-2502-2503-2504-2505-2506-2507-2508-2509-2510-2511-2512-2513-2514-2515-2516-2517-2518-2519-2520-2521-2522-2523-2524-2525-2526-2527-2528-2529-2530-2531-2532-2533-2534-2535-2536-2537-2538-2539-2540-2541-2542-2543-2544-2545-2546-2547-2548-2549-2550-2551-2552-2553-2554-2555-2556-2557-2558-2559-2560-2561-2562-2563-2564-2565-2566-2567-2568-2569-2570-2571-2572-2573-2574-2575-2576-2577-2578-2579-2580-2581-2582-2583-2584-2585-2586-2587-2588-2589-2590-2591-2592-2593-2594-2595-2596-2597-2598-2599-2600-2601-2602-2603-2604-2605-2606-2607-2608-2609-2610-2611-2612-2613-2614-2615-2616-2617-2618-2619-2620-2621-2622-2623-2624-2625-2626-2627-2628-2629-2630-2631-2632-2633-2634-2635-2636-2637-2638-2639-2640-2641-2642-2643-2644-2645-2646-2647-2648-2649-2650-2651-2652-2653-2654-2655-2656-2657-2658-2659-2660-2661-2662-2663-2664-2665-2666-2667-2668-2669-2670-2671-2672-2673-2674-2675-2676-2677-2678-2679-2680-2681-2682-2683-2684-2685-2686-2687-2688-2689-2690-2691-2692-2693-2694-2695-2696-2697-2698-2699-2700-2701-2702-2703-2704-2705-2706-2707-2708-2709-2710-2711-2712-2713-2714-2715-2716-2717-2718-2719-2720-2721-2722-2723-2724-2725-2726-2727-2728-2729-2730-2731-2732-2733-2734-2735-2736-2737-2738-2739-2740-2741-2742-2743-2744-2745-2746-2747-2748-2749-2750-2751-2752-2753-2754-2755-2756-2757-2758-2759-2760-2761-2762-2763-2764-2765-2766-2767-2768-2769-2770-2771-2772-2773-2774-2775-2776-2777-2778-2779-2780-2781-2782-2783-2

/ Sym 196r b12-196v b3/Schl. V 36,68-105 ,nmΔ

/correxī (cf. Ar 6,63) : Syc 𐤒𐤓𐤕𐤌𐤍 : 𐤒𐤓𐤕𐤌𐤍 352b5

correxī : Syc 𐤓𐤕𐤕𐤕[...]: 𐤓𐤕𐤕𐤕 352b6

/ supplevi (v.Sym) : אֶת־הַמִּשְׁכָּה .אִי־לֵב 352b12

an sup- : supplevi (v.Sym) : 𐤀𐤍𐤔𐤏𐤕 𐤔𐤏𐤕𐤏𐤕𐤓𐤓 𐤔𐤏𐤕 352b13

/plendum ಕಡಿದು ಕಡಗಿಡು ~~ದ~~ ?

/ supplevi (v.Sym) : 𐤔𐤕𐤕 𐤕𐤕𐤕𐤕 352b14

cf. Engl. : Sym  : supplevi:  352b21

/ transl. of Ar 6,81, note

[illegible]

[illegible]

1. חתום על חוזה / Sym 180v a6-b8/Schl. V 5
 2. חתום על חוזה / Sym 180v a6-b8/Schl. V 5
 3. חתום על חוזה / Sym 180v a6-b8/Schl. V 5

353a20-21 ... חסד וחסד ... חסד וחסד ...
 חסד וחסד ... חסד וחסד ... חסד וחסד ...
 חסד וחסד ... חסד וחסד ... חסד וחסד ...
 /Sym 182v a4-11/Schl.V 9,20-23
 inc.Sym 182r b27/חסד וחסד : חסד וחסד
 / lac.Syc : חסד וחסד / Schl.V 9,14
 / Sym : חסד / Sym - : חסד וחסד
 : חסד וחסד 353a23 / lac.Syc : Sym
 finis : Sym חסד וחסד חסד וחסד
 / Sym 182 a3/Schl.V 9,19

... חַדָּשׁ / inc. Sym 182r b19/Schl.V 9,10 : אֶת־כֶּסֶף 353a24
Sym - : אֶת־כֶּסֶף / Syc - : אֶת־כֶּסֶף 353a25 / lac.Syc : Sym אֶת־כֶּסֶף
/ lac.Syc : Sym אֶת־כֶּסֶף / Sym (post אֶת־כֶּסֶף) אֶת־כֶּסֶף : אֶת־כֶּסֶף /
/ Syc - : Sym אֶת־כֶּסֶף 353a26 / lac.Syc : Sym אֶת־כֶּסֶף
/part.lac.Syc : Sym אֶת־כֶּסֶף / Sym אֶת־כֶּסֶף : אֶת־כֶּסֶף
/ finis Sym 182r b26/Schl.V 9,14 : lac.Syc : Sym אֶת־כֶּסֶף
XIV (195r a / supplevi (cf. Ar 13,30) : אֶת־כֶּסֶף 353b3
Sym (ms. Paris 241) - : אֶת־כֶּסֶף ... אֶת־כֶּסֶף

IV. THE SYRO-ARABIC TRANSLATION BY BAR BAHLŪL

The translation by the Nestorian Abū l-Ḥasan Ibn Bahlūl, also known under his Syriac name Bar Bahlūl (10th century A.D.)³³ is included in his *Book of Indications* (*Kitāb ad-Dalā'il*), a comprehensive work on astrometeorology³⁴. G. Bergsträsser published it in 1918 according to the Istanbul ms. Aşir Efendi I 1164 (fol.88v-93r).³⁵ As this copy from the year 850/1446-7 is full of mistakes, the edition and German translation by Bergsträsser contain many faults.

Fortunately a second Arabic ms. has become known, the Istanbul ms. Hekimoğlu 572 from the year 556/1161 which now is available in a facsimile edition by Fuat Sezgin.³⁶ On p. 307-23, it offers a much better text of Bar Bahlūl's translation. As this copy too is not free from mistakes, we have edited the text here, using both manuscripts and comparing it with the translation of Ibn al-Khammār.

Bar Bahlūl's translation is preceded by a summary of Aristotle's meteorology³⁷, of what he found "remarkable" (*gharīb*) in it. On this chapter follows a *Treatise on Meteorology, according to Theophrastus*. Bar Bahlūl adds: "I have found a treatise by Theophrastus in Syriac which I have translated and of which I present a summary".

Bar Bahlūl's version appears to be an independent Arabic translation of the same Syriac text which was used by Ibn al-Khammār. It is less exact; the translator offers—as he informs the reader—the text in a shortened form (*wa-khtaṣartuhū*) and includes two additional passages³⁸. As a comparison with Ibn al-Khammār's

³³ Cf. Baumstark, *Geschichte der syrischen Literatur*, p. 241 f.; Henri Hyvernat, 'An Ancient Syriac Lexicographer,' in: *The Catholic University Bulletin* 8, Washington 1902, p. 58-74.

³⁴ See the description by Fuat Sezgin, *Geschichte des arabischen Schrifttums* VII (Leiden 1979) 282 f. and 332 f. and by Joseph Habbi, 'Les sources du Livre des signes d'Al-Ḥasan Ibn Bahlūl,' in: *Orientalia Christiana Analecta* 226, Roma 1986 (= Actes du deuxième congrès International d'Etudes arabes chrétiennes, ed. Kh. Samir), p. 193-203.

³⁵ See the conspectus siglorum, As. —The German translation, slightly revised, is republished in Reitzenstein p. 86-108; an incomplete English translation of Bergsträsser's German version, including some emendations suggested by Paul Kahle, appeared in Cyril Bailey, *T. Lucreti Cari De rerum natura libri sex*, Oxford 1947, p. 1745-8. —The text is part of an appendix to an astrometeorological work with the title *Kitāb as-sudā'* and ascribed to Daniel; cf. on this work Sezgin, *Geschichte des arabischen Schrifttums* IV (Leiden 1971) p. 42 and VII (1979) 313 f. where the ms. used by Bergsträsser is referred to as Reisülküttap 1164.

³⁶ *The Book of Indications—Kitāb al-Dalā'il*. By Al-Ḥasan ibn al-Bahlūl. Frankfurt 1985. = Publications of the Institute for the History of Arabic-Islamic Science, series C, vol. 10.

³⁷ Ms. Hekimoğlu 572, p. 287-308.

³⁸ Ba 6,24-38 (see below n. 46) and Ba 14,9-13 = Be p. 24 ch. 59-60 (based on Aristotle, *Meteor.* III 2-3).

translation shows³⁹, he has omitted many passages, long sections and even complete chapters⁴⁰; Bar Bahlūl's text thus offers an incomplete picture of Theophrastus' *Meteorology*. Moreover, Bar Bahlūl sometimes offers simplifying formulations⁴¹ or other examples⁴²; he omits the titles of the chapters, concluding remarks by Theophrastus or even illustrative examples⁴³. Especially in his omissions of single sentences and words we should not always exclude the possibility that Bar Bahlūl used a defective ms. of the Syriac translation. At least in one case his Syriac copy shares a mistake with the Syriac text used by Ibn al-Khammār⁴⁴.

In view of these omissions and changes, the contribution of Bar Bahlūl's version to the reconstruction of Theophrastus' *Meteorology* is rather restricted. However, it is helpful in the confirmation of doubtful readings of the preserved mss. of Ibn al-Khammār's complete translation⁴⁵. Its value is increased by the comparison with Ibn al-Khammār's translation which can give us now a clear picture of what is added⁴⁶, omitted, or changed by Bar Bahlūl⁴⁷.

Since the version of Bar Bahlūl does not give us additional information on Theophrastus' *Meteorology* and appears to be an abridged translation of the same Syriac version which was carefully translated into Arabic by Ibn al-Khammār, we could refrain from translating it here.

³⁹ See below Syro-Arabic apparatus.

⁴⁰ Ch. 5, 7, 8 and 11.

⁴¹ Cf. e.g. Ba 13,19 ff. with Kha 13,43 ff.

⁴² Cf. Ba 15,4-6 = Be p. 24 ch. 63 with Kha 15,5-7 and the additional note Ba 6,24-38 = Be p. 18 ch. 29-35: this addition by Bar Bahlūl alludes in Ba 6,37-38 = Be p. 18 ch.35 to a passage in Kha ch. 7 (*On the causes of clouds*), line 7-9 in which the rain is illustrated by vapor accumulating at the roof of a bathroom and thus becoming water. Bar Bahlūl informs us that he refrained from presenting a summarizing version of the chapter on the causes of rain because according to his observation, its content is identical with what he had already recorded in his former report on Aristotle's *Meteorology* (s. above n. 37). Bar Bahlūl therefore omitted chapters 7 and 8, but also 5 and 11. —The German translation by Bergsträsser is based on a corrupt text and incorrect. Bar Bahlūl does *not*, as Bergsträsser claimed (p. 18 n. on ch. 35), announce an unabridged report on the causes of rain; Bergsträsser's supposition that the Arabic text here contains a lacuna is wrong and cannot be confirmed either from the Syriac or from the Arabic translation by Ibn al-Khammār.

⁴³ Ba 15,17 omits Kha 15,29-30.

⁴⁴ See Ba 4,4, Arabo-Syriac apparatus.

⁴⁵ Cf. e.g. Arabic apparatus 1,8.

⁴⁶ Cf. Ba, Arabo-Syriac apparatus 2,4; 6,24-38; 13,45 and 14,9-13.

⁴⁷ See Ba, Arabo-Syriac apparatus.

The Syro-Arabic Translation by Bar Bahlul

قال الحسن بن البهلول رحمه الله : قد مضى ما جمعته
مما وجدته غريبا من حكاية ارسطاطاليس ،

عن ثاوفرسطوس في الآثار العلوية ،

Be 12 / وجدت لثاوفرسطوس بالسريانية مقالة نقلتها
5 واختصرت منها ما انا مورده وبالله المستعان ،

[1]

قال انّ الرعد يكون من سبعة اسباب : احدها اذا
التقت غمامتان عميقتان فتصادمتا فحدث بينهما
صوت ، ونحن اذا عمقنا الكفين وصفقنا بهما كان لهما
صوت شديد ،
5 وثانيها اذا دخلت في السحاب المجوفة ريح ودارت فيها ،
وفيما نشاهد /As 89r/ ان الريح /He 309/ اذا هبّت
ودخلت في المغارات والخابىء احدثت صوتا ،
وثالثها اذا وقعت النار في سحاب رطبة فانطفأت ،
وفيما نشاهد انّ الحداد اذا رمى بحديد محمى في الماء
10 وجدت له صوتا شديدا ،

ورابعها اذا صفقت السحاب العريضة الجلدية الريحُ
بشدّة ، وفيما نشاهد أنّ الريح اذا صفقت قرطاسا أحدثت
صوتا كبيرا ،

وخامسها اذا دخلت الريح في سحاب طويلة متصلة
جوفاء ، وفيما نشاهد أنّ الطبّاخين اذا نفخوا المصران 15
كان لسلوك الريح فيها صوت ،

وسادسها اذا احتبست في سحاب مجوفة ريح كثيرة
فانشقّت ، وفيما / نشاهد أنّ المثانة اذا نفخت حتى
Be 14 تنشقّ /He 310/ أحدثت صوتا شديدا ،

وسابعها إن يحتكّ بعض السحاب الخشنة ببعض ، وفيما 20
نشاهد أنّ الارحاء اذا احتكّ بعضها ببعض احدثت صوتا ،

[2]

والبروق يمكن ان تكون من اربعة اسباب : الأول
والثاني على معنى الاصطفاق والاحتكاك ، وفيما نشاهد أنّ
النار تخرج من الحجارة اذا اصطفت ، وينقدح الخشب
اذا احتكّ بعضه ببعض كما يقدح بالزناد ، والثالث
5 /As 89v/ اذا انطفأت النار في سحاب رطب واشتعل
ما كان منها لطيفا ، وفيما نشاهد ان الحدّادين اذا
طرحوا الحديد المحمّى على الماء حدثت اشتعالات مّا ،
والرابع إن يكون في السحاب /He 311/ نار محتبسة

فيتلبد السحاب وينضغط او يتفرق وينفتق
كالاسفنج او جزء من صوف فيها ماء : فاذا
انعصرتا او تفرقتا خرج بينهما الماء الذي فيهما ،
كذلك السحاب تتراصف وتنعصر فاذا تخلخلت
وانفتقت خرج البرق ،

10

[3]

يكون الرعد من غير برق من ثلثة اسباب : إما الا
يكون في السحاب نار محتبسة وإما ان تكون قليلة ولا
تكمل أن تعمل برقاً او تكون كثيرة غير انها لا تقدر
على الخروج من اجل تراصف السحاب ،

[4]

والبرق بغير رعد من سببين : إما ان يكون
القرع والاحتكاك في السحاب ساكنين /He 312/ حتى
ان النار تزلق وتخرج ويحتبس الصوت وإما ان
تتخلخل السحاب ولا تتراصف فتولد برقاً ولا يكون
/ معه صوت ، وفيما نشاهد أن الاسفنج اذا تفرقت
وانعصرت خرج الماء الذي فيها ولم يكن له صوت ،

Be 16

5

[6]

إِنَّ الصاعقة إما ريح نارية وإما نار ريحية وذلك
 انها إن وقعت في جبل او حطب احرقت واشتعلت وإن
 وقعت على ذهب /As 90r/ او فضة سبكتهما
 وذوّبتهما ، وهذه الافعال انما تكون من النار وبعد فانها نار
 ليس بالجمرية لكن لهبية ، وذلك انها اذا وقعت على
 الأرض لا توجد جمرة ولكن اكثر ما يرى الموضع الذي
 تسقط فيه الصاعقة انها تثقبه وتشقّه ، وهذه /He 313/
 الافعال من خواصّ النار مع الريح الا انّ الصاعقة ألطف
 من سائر النيران اللهبية التي عندنا وذلك ان النيران التي
 عندنا لا تنفذ في حائط ولا ارض ، والصاعقة تنفذ في
 كل جوهر محسوس ولا ترى لانها تسبق بصرنا بلطفها
 والصاعقة لم يرها احد ولكن افعالها ترى وهي لا ترى ،
 وتكون الصاعقة من شيئين إما اذا احتبست النار في
 الغمام ثم اندفعت بغتة بالعنف الشديد وإما اذا احتبست
 الريح في الغمام فبجولانها واحتكاكها بالغمام وخروجها
 بالعنف بغتة ومصيورها الينا تنقذ وتشتعل كمثّل
 الاسرب الذي يرمى به في المقلاع فاحتكاكه مع الهواء
 الحمي ويلتهب /He 314/ وينحلّ ، وقالوا إنّ الصاعقة
 اذا وقعت على كيس فيه دنانير لم يفسد الكيس وافسدت
 الدنانير وسبكتها ، وذلك ان الكيس متخلخل ويكون

Be 18

للصاعقة فيه طريق / لسلوكها والدنانير لأنها صلبة لا يكون
فيها موضع سلوك فتصادم الصاعقة حتى تفسد
الدنانير وتسببها ولا تفسد الكيس ،

[Additional note by Bar Bahlūl:]

قال الحسن بن البهلول : اني رأيت ببلد الروم أيام
25 مقامي هناك اثرها في طاق لبيعة اليعقوبية صبيحة
اليوم الذي وقعت فيه كأنها خطّة موريّة على خط
مستقيم الى أن وصلت الى الارض ودخلت فيها وليس لها
اثر احراق ، ورأيت لها اثرا اخر بهمذان /He 315/ ايضا
في باب وقعت عليه على وراب ايضا وهى كالخطة حتى
30 وصلت الى الارض ودخلت ولم تحرق خشب الباب ولا
سوّدت بل نفذت فيه ولم يتفرج ، وهذا مخالف لقول
ثاوفرستوس إنها تحرق الحبل والخشب ، وقد حكى لى
انها وقعت على انسان فقتلته بنفوذها في بدنه الى
الأرض ، وقد مرّ في النسخة التي وجدتها بالسريانية من
35 علل الامطار ما لم اختصر منه شيئا لأنه في المعنى
الذي اورده قبل بل شبه ما يجتمع من البخارات
فيقطر منه المطر كما يرتفع الى قبة الحمام من
البخار الرطب فاذا لم يجد نفوذا فيه قطر ونقط ،

[9]

وقالوا : إنَّ /As 91r/ الثلج /He 316/ يكون اذا انعقد

السحاب من البرد قبل ان يستحيل ماء الا انه قبل
ان يجتمع بعضه الى بعض بل هو منبث بعد

Be 20

ومنقسم نقطا صغارا جداً والهواء يفصل /بينهما ،

5 وذلك انا نرى ظاهرا في الثلج هواء كثيرا محتبسا

فيه ، ويعلم هذا من خفته ومن حيث يعصر فينعصر

كميته ومن حيث يقل اذا انحل ماء ، ويكون الثلج

أبيض من اجل كثرة الهواء المحتبس فيه ، وكذلك جميع

الأجسام التي يحتبس فيها الهواء الكثير تكون بيضا

10 كالرغوة والدهن الذي يضرب مع الماء والبزر ،

[10]

والبرد يكون اذا استحالت النقط من الماء وانعقدت

من اجل البرودة ، وتكون حجارة البرد /He 317/

مستديرة إما لان زواياها تنكسروتملس في نزولها او

يكون من عنصر {ليس} له بالطبع ان يكون مستديرا اعني

5 الماء او لان البرودة تعقده وتلبده من كل جهة على هذا

الحال بعينها ،

[12]

والزمهرير والجليد يكونان إذا انعقد الندى من البرودة ويكون الجليد أبيض من أجل الهواء المحتبس فيه ، وذلك أن الشيء الذي يكون فوق ثلجا يكون أسفل زمهريرا ،

[13]

قالوا : إنَّ الرياح تتولد /As 91v/ إما من فوق وإما من أسفل ، وأما ما يتولد من أسفل فإما من الماء وإما من الأرض ، وذلك انا قد نرى الزوابع تنحدر من السحاب ونرى الرياح تهبّ من الماء ومن الجبال ، وتتحرك الرياح 5 إما من أجل خففتها اذا طلبت العلو كما قلنا إنها بخار وإنَّ الغالب عليها /He 318/ اللطيف وإما لأنَّ الهواء ربما تلبد في مكان / شرقي في وقت وفي مكان غربي في وقت وفي شمالي او في جنوبي ، فاذا تابد هناك ولم يجد مكانا خاليا جرى الهواء من ناحية الى ناحية اخرى يقابلها بقهر 10 الخلاء اياه ويجذب معه بخارا من الماء ومن الأرض حتى لا يبقى مكان خال ، وكذلك فيما نشاهد انا اذا وضعنا رأس أنبوب على وجه الماء وجذبنا الهواء الذي في الانبوب بالمصّ وقهر الخلاء حتى لا يوجد موضع خال في الانبوبة صعد الماء وملا الأنبوبة ، وكذا تتولد الرياح من أسفل ، فأما تولدها 15 من فوق فانه يكون اذا انحلّ الماء الذي فوق في السحاب

Be 22

الى /He 319/ الرياح وارتفعت بخارات كثيرة من الأرض ،
 فاذا صدمت السحاب أو الهواء الجائل فوق رجعت بغثة
 تطلب السفلى ،

فريسطير هي الزوبعة كالعمود الهوائي الذي ينزل من
 السماء /As 92r/ الى البحر ، وهذا ايضا ربما يجذب
 السفن الى فوق ، وفريسطير هذا يسمى زوبعة
 واسطروبولوس ومعناه الفلك ، ويكون إما من سحاب
 اذا استقبلت السحاب الجوفاء الرياح فاذا دفعتها الرياح
 امتدت الى البحر أو من ريح تندفع قهرا وتجذب
 البحر والسفينة نحو العلو لان الرياح بعينها اذا صدمت
 جذبت بالقهر رجوعا وبرجوعها تدفع الهواء ، فاذا اندفع
 الهواء حتى لا يجد مكانا خاليا صعد الماء والسفن معه ،
 وتنزل هذه الرياح السفن /He 320/ التي تدفعها من غير
 ان تفسدها اذا لم يتفق بغثة لكن تسترخي قليلا قليلا ،
 وتهلك السفن اذا انفتقت الرياح من سبب ما
 فسقطت السفن عن الرياح قهرا ،

[14]

Be 24 /وتكون الدائرة حول القمر اذا غلظ الهواء وامتلأ
 بخارات حتى تحدث فيه حركة مستديرة من ضوء القمر كما
 انا اذا رمينا حجرا في الماء حدثت فيه حركة مستديرة

5 حول الحجر ، او لأنّ الشعاع اذا وجد الهواء غليظا لطف
الموضع الذى يقابل القمر ، وذلك انه كلما لطف هذا الجزء
من الهواء غلظت الاجزاء التى حوله اكثر ، ومن اجل ذلك
يصير الهواء الذى حول هذا الجزء /As 92v/ دارة ،

[Additional note by Bar Bahlūl:

10 وانا اقول إنّ ضوء القمر ينفذ فيما يليه من البخار على
/He 321/ خطوط متساوية فيتناهى من سائر جوانبه
على استدارة ، فان كان البخار خفيفا نفذ الضوء فيه
أكثر وكانت الدارة اوسع وإن كان غليظا لم ينفذ فيه
ضوء القمر كثيرا وكانت الدارة اضيق ،]

15 وتنجلي دارة القمر اذا هبّت ريح شديدة ففرقت الغليظ
او اذا جاء مطر ،

[15]

والزلازل تحدث في الأرض من اربعة أسباب : إما مما
يسقط من تجويف في الأرض كالمغارات والحُفَر العميقة
التي فوقها ، وتسقط اذا جفّت الأرض وتفركت او
لأنها تتربط وتنحلّ ، فقد نرى في بلاد الحجارة انه
5 متى سقط منها حجر واحد وزال عن موضعه تززع

جميع الانبار ، وإما اذا كان /He 322/ في تجويف من الأرض ماء محتبس فاذا تحرك هذا الماء حركة لانه يجد مخرجا ضيقا او من سبب آخر حرك الأرض كما تتحرك السفينة من الامواج ، وإما ان يكون في تجويف الأرض رياح كثيرة محتبسة فاذا خرجت /As 93r/ من منفذ ضيق تزعزعت الأرض ، فلذلك ربما كان مع الزلازل أصوات ،
 10 / وإما أن يكون في تجويف الأرض نار محتبسة فاذا لطفت الهواء الذي في تجويف الأرض وحلّته وخلخلته احتاج الى فضل موضع ، ومن أجل ذلك يشقّ الأرض ويزعزعها ،
 15

Be 26

قالوا : والزلازل تختلف فيكون منها اهتزاز كما اذا سقط شيء في تجويف الأرض ، ومنها ميل وانقلاب اذا خرجت الريح قهرا /He 323/ صدمت جزءا من الأرض فاذا رجعت قهرا صدمت جزءا ما اخر ، والميل فقط اذا صدمت الريح ولم ترجع إما لانها تتبع الهواء او لأنها تكون قوتها تسترخي قبل ان تصدم جزءا اخر من الأرض ،
 20

Bar Bahlül, Arabic Apparatus

1, procœmium, قال : + ابو As / بهلول As / رحمه الله : - As /
 3 ناوفرستوس He As : correxī / 3-4 في الاثار ... لناوفرستوس :
 He i. marg. / 4 وجدت As / لشارفرطوس As / 5 المستعان :
 نستعين As / 1,1 قال : الرعد prēm. As / اسباب : اشياء As /
 1,2 التقت : التقيت As / فتصادمتا : فتصادفتا As / حدث As /
 1,3 عمقنا (بدمه Syc. cf.) : اغمضنا As / 1,5 وثانيها :
 وثانيهما As / نشاهد : يشاهد (et al. loc.) He / 1,7 في : - As
 / مغارات As / والخوابي : - As / احدثت : احدث ذلك As /
 صوتا : ضربا شديدا As / 1,8 السحاب As / وانطفأت As / 1,9
 وحى : حامى As / 1,10 حدث له صوت شديد As / 1,11 رابعها
 As / صفقت : انشقت As / الجليدية As / 1,13 كبيرا : شديدا As
 / 1,14 متصلة : مثقلة As / 1,15 جوفاء : جوفها He : جوفها As :
 correxī / 1,18 وانشقت As / 1,19 احدث As / 1,21 الرحي As
 / احتكت As / 2,1 البرق As / يكون As / 2,3 صفقت As /
 2,4 قدح الزناد As / 2,5 انطفأت : انطبقت As / 2,6 وفيما نشاهد
 ان : ونحن نشاهد As / 2,7 احدثت As / 2,9 فيلبد As / وينضغط
 : ويسقط As / وينفتق : وينشق As / 2,10 جزء : جره As / صوف :
 صرف As : + فيكون He / 2,11 بينهما : legendum منهما ؟ (cf.
 2,15) Kha / 3,1 ويكون As / من غير برق : يعتبر As / الا : لان

لا As / 3,2 نارا محتبسة As / واما ان : وان As / تكمل : يكمل
 As / 3,3-4,1 كثيرة ... رعد : - As / 4,1 سبين : شيئين As /
 4,2 الفرق : من الفزع As / 4,3 ويحتبس : وتحبس As / 4,4
 تتخلخل السحاب : يتحلل السحاب As / او يتراصف He As :
 correxī (cf.Sym) / فيولد برق As / 4,5 استفنجات As / 6,1 إن
 : - As / ذاك As / 6,3 وذوبتهما : وذوبتهما As : او ذوبتهما He
 / 6,4 الافعال : افعالها As / فانها : + من As / 6,6 لا : لم As /
 6,7 انها تثقبه وتشقه : انما نرى اثر فعلها As / 6,8 الافعال As :
 افعال He / مع الريح : - As / الا ان : لان As / 6,9 اللهيبة As /
 وذلك ان : وتلك As / 6,10 عندنا : - As / تنفد As / ولا ارض : في
 الارض As / والصاعقة : + التي As / 6,11 ولا : لا As / لانها
 تسبق : لانا انشق As / 6,13 واما As / 6,14-15 ثم اندفعت ... في
 الغمام : - As / 6,15 فبجولانها : فنحو ذلك لانها لطيفة As / 6,16
 بغتة : تعبـة As / ينقدح As / 6,17 به : - As / بالمقلع As / 6,19
 يفسد : تفسد As / 6,20 الكيس : + لانه متحلل As / ويكون :
 تكون As / 6,21 : الصاعقة As / طريقا As / 6,22 فتصادم :
 فتضاده As / 6,24 بهلول As / 6,25 اليعقوبية : - As / 6,26
 خطة مورية : حنطة مورية As / 6,27 وليس : اذ ليس As / 6,28 اثر
 : - As / احتراق As / لها اثرا اخر بهمذان ايضا : ايضا اثرها
 بهمذان As / 6,29 على وراب : فداب من الباب النحاس خشب As /
 كالخطة : كالحنطة As / 6,30 وصلت : حصلت As / فدخلت As /

خشب الباب : الخشب الذي هو الباب As / 31-30,6 ولا سودت :
 والاسود As / 31,6 نفذت : نقدف As / يتفرج : يتفرح As / 32,6
 لى : - As / 33,6 انها : + اذا As / 33,6 بنفوذها : بنفوخها As /
 35,6 اختصر منه : اقتصر فيه As / معنى He / 36,6 اورده قبل بل
 شبه : اردته وقصدته As / 37,6 منه المطر : من المطر As / كما As
 : بما He / ترتفع As / الى قبة : في As / 38-37,6 من البخار :
 البخارات الرطوبة (sic) As / 38,6 تجد As / فيه : - As / ونقط :
 - As / 2,9 ماء : من الماء As : + استحالته As / 3,9 منبث : مثبت
 As / 4,9 ومنقسم : وينقسم As / والهواد : + والهواء He
 (ditto gr.) / 5,9 وذاك As / 6,9 فيه : قبل As / ويعلم : ونعلم As
 / 7,9 كميته : - As / 8,9 اجل : - As / 9,9 الاجسام : الاقسام
 As / التي : الذي As / تكون : ويكون As / بيضا : ايضا As /
 10,9 واليزر : - As / 2,10 البرودة : الرطوبة He As (cf. :
 10,3 / Kha 10,3 او : ان As / 4,10 { ليس } : cf. He As sic
 10,4 / Kha 10,4 بالطبع : طبع As / ان يكون مستديرا : مستدير As /
 10,5 تعقده : لعقد As / وتلبده : ويلبده As / 3,12 الذي : - As /
 يكون (2. loco) : ويكون As / 1,13 قالوا As : - He / اما As : -
 13,2 / He واما ما : وما As / 3,13 نرى : + ان As / تنحدر :
 يتحد He / السحاب As / 5,13 كما : + اذا As / 6,13 تلبد : يلبد
 As : 13,9 / Kha at cf. 13,7 مكان (2.loc.) : - As / 8-7,13
 او في شمالي As / 9,13 يقابلها : يقبلها As / 10,13 ويجذب :

ويحدث He / 13,11 مكانا He / خال : - As / وكذلك : وكذا As /
 نشاهد : يشاهد As He : correat Be / 13,13 موضع : - As /
 الانبوب As / 13,13-14 صعد الماء وملا الانبوبة : - As / 13,14
 فكذا As / 13,15 في : - As / 13,16 وارتفعت : هو ولد بعد As /
 13,17 الجائل : الحائل As / 13,18 السفلى : اسفل As / 13,19
 فريسطير هي : فتستطير As / كالعمود : كالعود As / 13,20
 يجذب : جذب As / 13,22 واسطروبولوس : واسطورا لا توازن As /
 13,23 الرياح : لرياح As / دفعتها : رفعتها As / 13,24 او : - As
 / 13,25 السفينة As / بعينها : يعسفها As / 13,26 رجوعا : جزعا
 As / 13,27 الهواء : - As / 13,28 للسفن As / الذي يرفعها As /
 13,29 يفسدها As / 13,30 انفتقت : اقتفت As / 13,31 فسقطت
 : يسقط As / بالسفن As / قهرا : - As / 14,1 فتكون As /
 14,1-2 وامتلا (او امتلا He) بخارات : - As / 14,2-3 من ضوء
 ... فيه حركة مستديرة : - (homœotel.) As / 14,9 ينفذ : يتقد
 As / البخارات As / 14,10 فيتناهى : فبيننا هي As / 14,14
 القمر : - As / الغليظ As : الغلط He / 14,15 او اذا : واذا As /
 المطر As / 15,1 مما : ما As / 15,2 العميقة : - As / 15,4 او
 لانها : ولانها As / نرى : يرى As / 15,5 متى : + ما As / 15,6
 الانبار [= الاكداس] : الابيار As / واما اذا : واذا As / 15,8 او
 من : ومن As / اخر : وقد As / 15,10 رياح : ارياح As / من :
 في As / 15,11 زعزعت As / 15,12 نارا As / 15,13 لطففت :

انطفت / As وحلته : وحلته / As 15,14 / يشق : تشقق / As 15,15
وتزعزعا / As 15,16 / كما : - / As 15,17 / في : من / As 15,18
فصدمت / As 15,19 / اذا : فاذا / As / صدمت (2. loc.) : صادمت
/ As 15,20-21 / لانها تكون قوتها : لان فوقها / As 15,21 / يسترخى
/ As الارض : + تمت الملحمة جميعها بحمد الله ومنه وحسن توفيقه
والحمد لله وحده وصلى الله على سيدنا محمد وآله وصحبه وسلم
وحسبنا الله ونعم الوكيل .As.

Arabo-Syriac Apparatus

Bar Bahlūl compared with the Syro-Arabic translation by
Ibn al-Khammār

- متصلة 1,14 / Kha praemittit titulum capit. (et al.loc.) 1,1
(translatio non exacta) : ملتوية 1,16 / Kha 1,21 صوتا : صوت
شديد 1,23 / Kha : + فمن هذه ... الشك 1,24-38 / Kha 2,4 كما
يقدر بالزناد (add. Ba ut vid.) : Kha 2,9 - : + وذلك ...
ويخرجونه 2,7-9 / Kha 2,13 البرق : + فهذه الاسباب ... منها
Kha 2,17-18
3,4 / Kha 3,5-6 السحاب : + فإن ذلك ... البرق 4,4 / Kha
(1.loc.) : او (mss. arab.) et Ba (mss. arab.) : correxī
/ Ba - : Kha cp.5 / (cf. Sym)
6,7 الصاعقة : + كثير الدخان 6,9 / Kha 6,12 ترى (2. loc.) : +
للطافتها ولسرعة ... البصر 6,15-16 / Kha 6,18 وينحل : +
والصاعقة ... السبب الذي له 6,21-86 / Kha 6,37-38 : cf. Kha
Ba - : Kha cp. 7 et 8 / cf. Kha 7,7-9
Ba - : Kha cp.11
12,3 زمهريرا : + والشئ الذي ... ماء 12,4-6 / Kha
13,1 : وأما الرياح ... اللطيف 13,2-3 / Kha 13,3
السحاب : + من فوق 13,5 / Kha 13,4 تهب : + من اسفل Kha
13,6 / 13,18 السفل : + والرياح تتحرك ... من القول في هذا Kha
13,21-22 / 13,21-42 زوبعة واسطروبولوس (cf. Sym) : Ba

- Kha 13,45 – : (add. Ba) ومعناه الفلك / Kha 13,45 زوبعة
14,7 هذا الجزء : + الذي قد لطف / Kha 14,8 دارة : + ونظير ذلك
... وعمل دائرة 14,8–11 / Kha
cf. Aristoteles, *Meteor.* III 2-3 : 14,9–13
Kha 14,13–29 الشهادة الملكية ... : + فمن هذه الاسباب
15,4 بلاد الحجارة : اسطوانة الحجارة / alteravit Ba : Kha 15,5
15,6 جميع الانبار : الاسطوانة كلها / alteravit Ba : Kha 15,7
15,12 نار : + كثيرة / Kha 15,12 / 15,15 ويزعزعها : + ومن هذه
الاسباب ... فيها الريح / Kha 15,15–25 تجويف الارض : +
ونظير ذلك ... اختلاجية Kha 15,29–30

V. THE SYRO-ARABIC TRANSLATION BY IBN AL-KHAMMĀR

As Theophrastus' *Meteorology* has been lost in its Greek original the oriental transmission is extremely important. However, its deficiencies—the fragmentary condition of the Syriac translation as well as the shortcomings of Bar Bahlūl's version—have until recently severely hampered attempts at reconstruction and evaluation. It was in 1971 when we first learned of the existence of a complete ms. of the *Meteorology* in a small Indian town east of Delhi, in the Raza Library of Rampur (= R)⁴⁸. Eight years later Fuat Sezgin in his *Geschichte des arabischen Schrifttums*⁴⁹ gave a first description of its contents and a first evaluation. In 1984 he published a facsimile edition of this ms.⁵⁰, which he considered to be unique.

Fortunately we have found two more copies⁵¹ of the complete Arabic translation in the Indian towns Aligarh (= A) and Hyderabad (= H), of which H is the oldest dated ms. (copied in 1614 A.D.) and written in a clear and mostly careful handwriting. In addition, we have also been able to consult four mss. from the 18th and 19th centuries ascribed to Ibn Sīnā (Avicenna) which Sezgin identified as a fragment of Theophrastus' Arabic *Meteorology*⁵². They contain the sections on thunder and lightning (= Kha ch. 1-6,28)⁵³.

An initial study of the text presented by these mss. immediately revealed the difference between this translation and that by Bar Bahlūl. We may take one example from ch. 1: the Syriac *n^{ec}ammeq* "we deepen (the hands)" in Syc 351a4 describes the idea of making hollow the hands which, when struck against each other, make a great noise. Bar Bahlūl retains the Syriac by taking the same Semitic root in Arabic, *ammaqnā*. Ibn al-Khammār, however, apparently wanted to use another picture to illustrate Theophrastus' example and took the Arabic word *farragha* "to make void (the hands)" in the sense of "to make hollow the hands". Bar Bahlūl

⁴⁸ See Intiyaz 'Ali 'Arshi, *Catalogue of the Arabic Manuscripts in Raza Library, Rampur*. IV, Rampur 1971, p. 537, nr. 2906. The additional remark on p. 537 "A treatise on Physics wrongly ascribed to b. Sīnā" is confusing and incorrect; only the following two numbers of the catalogue contain the fragment and are ascribed to Ibn Sīnā. On this fragment see below.

⁴⁹ Vol. VII, Leiden 1979, p. 216-23. Sezgin gives a wrong number (2307 instead of 2906) and a wrong date for the ms. (17th century instead of the 19th century).

⁵⁰ In: *Zeitschrift für Geschichte der arabisch-islamischen Wissenschaften* 1, Frankfurt/M. 1984, Arabic section p. 9-49.

⁵¹ During a stay in India (January 1984), supported by the Theophrastus project of Rutgers University (Brunswick/USA) and the National Endowment for the Humanities. I am most grateful to professor W. Fortenbaugh for his encouragement to do research in the oriental transmission of Theophrastus' *Meteorology* and his patience.

⁵² Sezgin VII p. 223.

⁵³ According to the Avicenna-bibliography by G.C. Anawati, *Essai de bibliographie Avicennienne*, Le Caire 1950), p. 128f. and Yahya Mahdavi, *Bibliographie d'Ibn Sina*, Teheran 1954, p. 31f. there are three more mss. of the Avicenna-fragment in Teheran, Cairo, and Hyderabad/India.

is mainly known as author of a comprehensive Syriac-Arabic dictionary including explanations of Greek words⁵⁴ and it is not astonishing to find in him a translator with much interest in etymology and in etymological translation. It is a pity that he offered a translation in shortened form and therefore did not always give a literal translation, omitting single words, sentences, and chapters⁵⁵.

The version by Ibn al-Khammār appears to be a much better translation. It too is based directly on the Syriac, as is evident from the translation of, e.g., Syriac *afger wa-l'wathān* in 351a8 with Arabic *wa-naẓru dhālika mā nadjiduhū 'indanā* in Kha 1,10. This is an attempt to paraphrase the Syriac *l'wathān*, "with us", "chez nous". Bar Bahlūl gave a translation *ad sensum* and rendered it with *wa-fīmā nushāhiduhū*, "accordingly we can observe" (Ba 1,9). In two cases Ibn al-Khammār kept to the Syriac in such a strict manner that his attempt at literal translation resulted in an inaccurate rendering, in so-called "Syriacisms": *k'yānā mayyānā* "watery substance" in Syc 352b29 is rendered by *ṭab'at al-mā* "nature of water" in Kha 7,3; the translator of Syriac *k'yānā* wrongly took the meaning to be "nature" instead of "substance" and rendered that into Arabic. —In a similar way we can explain the translation *madaratu ṣnin*, "a piece of clay" in Kha 6,81: Moses Bar Kepha has in his excerpt Syriac *qūlāṣ*,⁵⁶ "a piece of earth", whereas Syc is incomplete here. The Arabic translation "piece of clay" does not fit into Theophrastus' picture of a piece of earth which, contrary to clay, is dissipated during a long fall from a high place: here, the Arabic translation *madaratu ṣnin* is apparently based on Syriac *medhra* which means "clay" and "earth"; the Arabic translator wrongly took the meaning to be "clay" and not "earth" and rendered it into Arabic. —In one case the Arabic translator badly took over the Syriac word-order: in Kha 6,77 Arabic *wa-ṣ-sawāṣiqu min hādhihī takūnu* follows, with the exception of *wa-ṣ-sawāṣiqu*, the Syriac word-order *hānen d'menhen hāwen qerāno* [κεραυνοί] in Syc 352b17.

These examples of a bad translation are exceptions. In general the translation gives us a good idea of the Greek original and its contents. As the Arabo-Syriac apparatus shows, the Arabic translation by Ibn al-Khammār can be regarded as the best substitute for the Greek text and its Syriac translation. We have seen that the Syriac text transmitted to us has—compared with this Arabic version—lacunas, mistakes and omissions, and like Bar Bahlūl's abbreviated translation, it cannot claim to be a perfect mirror-image of its original.

The translator of the complete Arabic version must have had an excellent knowledge of Syriac and Arabic. In one case he uses a Persian word, *damaq* "hoarfrost"⁵⁷, and follows the practice of the school of the Christian translator Ḥunayn

⁵⁴ Ed. by Rubens Duval, *Lexicon syriacum*, I-II, Paris 1888-1890 (1901).

⁵⁵ See above section IV.

⁵⁶ See Syc 352b21, apparatus.

⁵⁷ See Kha 12,1.

Ibn Ishāq (808-873) in Baghdad by using the substitute “angel” for “god”⁵⁸.

This gives us an occasion to have a closer look at the authorship of this translation. Until now we have taken for granted the authorship of Ibn al-Khammār by following a suggestion of Sezgin⁵⁹. The Nestorian Ibn al-Khammār, whose complete name is Abū l-Khayr al-Ḥasan Ibn Suwār Ibn Bābā Ibn al-Khammār⁶⁰, was born in 331/942 or 943 in Baghdad and died around 421/1030⁶¹. He was a pupil of Yahyā Ibn ‘Adī⁶² and belonged to the philosophical circle of Abū Sulaymān as-Sidjīstānī in Baghdad⁶³. Later he was called to the court of Khwārizm-shāh Abū l-‘Abbās Ma’mūn II (1000-1017) where he met al-Bīrūnī and Ibn Sīnā. After the conquest of Khwārizm by Maḥmūd Ibn Subuktegin the new ruler took Ibn al-Khammār to his court at Ghazna⁶⁴. Ibn al-Khammār was much concerned with Aristotelian logic and in a critical note on Athanasius of Balad’s Syriac translation of Aristotle’s *Sophistici Elenchi*⁶⁵ he gives us an idea of his method of translation: “The translator who wants to convey the meaning <of the author whom he translates> must understand the language from which he translates so that he can think in it like a native speaker of the language, and he must know how to use the language from which he translates and the language into which he translates”⁶⁶.

⁵⁸ On this cf. G. Strohmaier, ‘Die griechischen Götter in einer christlich-arabischen Übersetzung,’ in: Franz Altheim/Ruth Stiehl, *Die Araber in der Alten Welt* V/1, Berlin 1968 (127-162), p. 131ff.

⁵⁹ See his *Geschichte des arabischen Schrifttums* VII p. 218.

⁶⁰ Cf. on him besides the references given below Bernhard Lewin, ‘La notion de muḥdaṭ dans le kalām et dans la philosophie. Un petit traité inédit du philosophe chrétien Ibn Suwār,’ in: *Orientalia Suecana* 3, 1954, p. 84-93; idem, ‘L’idéal antique du philosophe dans la tradition arabe. Un traité d’éthique du philosophe Bagdadien Ibn Suwār,’ in: *Lychnos* 1954-5 (Uppsala 1955), p. 267-84. Richard Walzer, *Greek into Arabic*, Oxford 1963, p. 66 and the literature given there. Walzer (and Kraemer [as n. 63] p. 126) follows the wrong suggestion of Bergsträsser (p. 1) that the translator of Theophrastus’ *Meteorology*, that version which was edited by Bergsträsser and which in fact was done by Bar Bahlūl, was made by Ibn al-Khammār.

⁶¹ Cf. on the date of his death the remarks by Dimitri Gutas, *Avicenna and the Aristotelian Tradition*, Leiden 1988 (= Islamic Philosophy and Theology. IV), p. 67, n. 6.

⁶² Cf. Gerhard Endress, *The Works of Yahyā Ibn ‘Adī*, Wiesbaden 1977, p. 8f.

⁶³ Cf. on this Joel L. Kraemer, *Philosophy in the Renaissance of Islam*, Leiden 1986, and index, al-Ḥasan Ibn Suwār.

⁶⁴ Cf. Zāhīr ad-Dīn al-Bayhaqī, *Ta’rīkh ḥukamā’ al-Islām* ed. Muḥammad Kurd ‘Alī (Damascus 1946) p. 26f./English paraphrase by Max Meyerhof, ‘‘Alī al-Bayhaqī’s Tatimmat Ṣiḥān al-Ḥikma’ (in: *Osiris* 8, Brugge 1948, 122-217), p. 138f. and Joel L. Kraemer, *Humanism in the Renaissance of Islam*, Leiden 1986, the article on Ibn al-Khammār p. 123ff.

⁶⁵ Arabic ms. Paris 2346, fol.380r = (with French translation) Khalil Georr, *Les Catégories d’Aristote dans leurs versions syro-arabes*, Beyrouth 1948, p. 198f.

⁶⁶ We follow the translation given by Walzer, *Greek* p. 83.

Ibn al-Khammār studied logic, medicine⁶⁷ and philosophy⁶⁸; he was also an expert on meteorology and wrote a treatise on atmospheric phenomena caused by water vapor, like the halo and rainbow⁶⁹. In two places he paraphrases a passage from Theophrastus' *Meteorology*, ch.14⁷⁰. Furthermore, he is mentioned in the *Catalogue (Fihrist)* by Ibn an-Nadīm (finished 377/987) as a translator from Syriac into Arabic who among other works translated a book on *Meteorology*.⁷¹ This book can scarcely be Aristotle's *Meteorology* as we do not have—besides the version of Ibn al-Biṭrīq⁷²—any testimonia or manuscripts referring to a translation of Aristotle's *Meteorology* by Ibn al-Khammār⁷³. Because Ibn al-Khammār cites Theophrastus' *Meteorology*, of which he paraphrases a passage from the complete version edited here, and because of Ibn an-Nadīm's testimony, it seems quite plausible to attribute to Ibn al-Khammār the Syriac-Arabic translation. The existence of this translation apparently enabled Arabic bio-bibliographers from Ibn an-Nadīm onward to mention among Theophrastus' works a book on *Meteorology*⁷⁴.

Since until now no other works by Ibn al-Khammār are available in print, we cannot use stylistic criteria as confirmation of his authorship. In any case, it is evident that his translation of Theophrastus' *Meteorology* has no rhetoric-stylistic peculiarities as we know them from the "schools" of Yahyā Ibn al-Biṭrīq or Ḥunayn Ibn Ishāq; it keeps strictly to the text translated—apparently conforming to the already mentioned method of Ibn al-Khammār himself. Consequently, our obser-

⁶⁷ On his medical works cf. Sezgin, *Geschichte des arabischen Schrifttums* III, Leiden 1970, p. 322f.

⁶⁸ Cf. the articles by Lewin mentioned above.

⁶⁹ *Maqāla fī l-āthār al-mutakhayyila fī l-djaww min al-bukhār al-mā'ī wa-hiya l-hālā wal-qaws wa-sh-shumūs wa-l-quḍbān*. On this not yet edited treatise see Sezgin, *Geschichte des arabischen Schrifttums* VII 284.

⁷⁰ See English translation Kha 14,3-11.

⁷¹ See Ibn an-Nadīm, *Kitāb al-Fihrist* ed. Gustav Flügel, Leipzig 1871/2 (repr. Beirut 1964) p. 265,9/ ed. Riḍā Tadjaddud, Teheran 1971, p. 323,15/English translation by Bayard Dodge, New York 1970, p. 633.

⁷² Ed. by Casimir Petraitis, *The Arabic Version of Aristotle's Meteorology*, Beyrouth 1967. New edition of book I, with Latin translation by Gerard of Cremona, by P.L. Schoonheim, *Aristoteles' Meteorologie in arabischer und lateinischer Uebersetzung*. Leiden 1978 (thesis Amsterdam).

⁷³ Here, I do not agree with F.E. Peters, *Aristoteles Arabus*, Leiden 1968, p. 9.

⁷⁴ Ibn an-Nadīm ed. Flügel 252,7/ed. Riḍā Tadjaddud 312,23/ English transl. Dodge 607; Ibn an-Nadīm's information is taken over by Qifī (died 1248 A.D.), *Ta'rikh al-hukamā'* ed. Julius Lippert, Leipzig 1903, p. 107,3; Ibn Abī Uṣaybi'a (died 1270 A.D.), *Kitāb 'Uyūn al-anbā' fī ṭabaqāt al-aṭibbā'* ed. August Müller (Königsberg 1884) p. 69,24 and Barhebraeus (died 1286 A.D.), *Ta'rikh mukhtaṣar ad-duwal*, Beirut 1959, p. 56,1f. —On information about Theophrastus in Arabic transmission cf. generally the articles by D. Gutas, 'The Life, Works, and Sayings of Theophrastus in the Arabic Tradition' and H. Daiber, 'A Survey of Theophrastean Texts and Ideas in Arabic: some new material,' in: *Theophrastus of Eresus. On His Life and Work*. Ed. by W.W. Fortenbaugh, together with P.M. Huby and A.A. Long, New Brunswick and Oxford 1985 (= RUSCH II), p. 63-102 and p. 103-14 respectively.

variations so far have *not* brought to light persuasive arguments *against* Ibn al-Khammār as translator of Theophrastus' Arabic *Meteorology*.

A final way to find arguments for Ibn al-Khammār's authorship may be a look at the influence of Theophrastus' Arabic *Meteorology* in Arabic literature. Here, we find that scientific texts of the 9th century, like Kindī's treatises on meteorological themes⁷⁵, do not echo ideas which can be traced back exclusively to Theophrastus' *Meteorology* or which are more similar to Theophrastus than to other meteorological sources, especially to Aristotle.

In contrast, the influence of Theophrastus' *Meteorology* is evident in the encyclopedia *Kitāb* (or: *Rasā'il*) *Ikhwān aṣ-ṣafā'*, "Book (or: Treatises) of the Sincere Brethren (= IS), which was compiled in scholarly circles of Irak perhaps by Abū Sulaymān Muḥammad Ibn Ma'shar (or Mu'sir, or Naṣr) al-Buṣṭī al-Maḥdī (or: Muqaddasī) before 959/960 A.D.⁷⁶. The 18th treatise deals with meteorology and contains typically Theophrastean ideas within an Aristotelian framework. Already in 1924⁷⁷ E. Reitzenstein drew attention to the parallels between IS and Theophrastus' *Meteorology*. In addition, he compared a second Arabic book, the cosmography *ʿAdjāib al-makhlūqāt wa-gharāib al-mawdjudāt* by Qazwīnī (died 1283 A.D.)⁷⁸, which mostly refers to the same Theophrastean ideas as IS. Reitzenstein used for his comparison German translations of the IS⁷⁹ and of Qazwīnī⁸⁰ and tended with Carl Bezold to the conclusion that Qazwīnī did not depend on IS and that both books have independently used a common source⁸¹.

⁷⁵ See *Rasā'il al-Kindī al-falsafīyya* ed. Abū Rīda (Cairo 1953) II 70ff. —The definition of wind as "flow of air" (ed. Abū Rīda II 71,8f.) is very common in Greek meteorological literature (with the exception of Aristotle) and not exclusively peculiar to Theophrastus: cf. the commentary on ch. 13. Therefore, we cannot agree with the thesis that Kindī made use of "either Theophrastus' *Meteorology*, or a commentary on this work" (William John Sersen, *Arab Meteorology from Pre-Islamic Times to the Thirteenth Century A.D.*, Thesis University of London 1976, p. 147). It seems to me that Kindī used Aristotle's *Meteorology*, perhaps with an hellenistic commentary which might have adapted some non-Aristotelian and ultimately Theophrastean ideas; the parallels collected by Sersen in ch. 5 and 6 are not sufficient to prove a direct dependence on Theophrastus' *Meteorology*. Even such an idea of snow as a frozen mixture of watery substance and air (Kindī II 84f.; cf. Sersen p. 188f.) cannot be traced back exclusively to Theophrastus' *Meteorology* (cf. Kha ch. 9) since it could also reflect an idea of Aristotle, *De Generatione anim.* 735 b 21.

⁷⁶ Cf. Susanne Diwald, *Arabische Philosophie und Wissenschaft in der Enzyklopädie Kitāb Iḥwān aṣ-ṣafā'* (III), Wiesbaden 1975, p. 15f.; rev. Daiber in: *Orientalistische Literaturzeitung* 76, Leipzig 1981, col. 46f.

⁷⁷ In his book *Theophrast bei Epikur und Lucrez*, p. 15-23.

⁷⁸ Cf. on him and his work T.Lewicki, art. Qazwīnī, Zakariyyā' B. Muḥammad B. Maḥmūd in: *Encyclopaedia of Islam*, New edition IV, Leiden 1978, p. 865-7.

⁷⁹ By Fr. Dieterici, *Die Philosophie der Araber im 10. Jahrhundert*, Teil V, 4. Abhandlung; 2nd edition Leipzig 1876 (reprint Hildesheim 1969).

⁸⁰ By H. Ethe, *Kazwinis Kosmographie. Nach der Wüstenfeldschen Ausgabe* [= Göttingen 1848-9] *aus dem Arabischen übersetzt*. I. Leipzig 1868.

⁸¹ Cf. Reitzenstein p. 15 and 16, n. 2.

This independence of Qazwīnī from IS is affirmed by W.J. Sersen⁸². —A fresh comparison of the Arabic texts shows without any doubt the similarities of Qazwīnī to the text of IS; both have partially the same terminology. However, both texts also have passages and meteorological ideas that are not shared; for example, the Theophrastean description of the hurricane drawing ships upwards (Kha 13,47f.) can be found in Qazwīnī⁸³ but not in IS⁸⁴. Therefore, the conclusion is inevitable that both have used a common source and that this source combined Aristotelian and Theophrastian thoughts on meteorology.

We have compared the Arabic texts of the *Ikhwān aṣ-ṣafā'* and of Qazwīnī with Theophrastus' *Meteorology* as translated by Ibn al-Khammār and have found many parallels, more than those collected by Reitzenstein⁸⁵ and later by Steinmetz⁸⁶. The compilatory character of their common source becomes evident, insofar as there are no literal correspondences between Theophrastus' *Meteorology* and the Arabic texts and insofar as the Theophrastean parallels are not confined to Theophrastus' *Meteorology* but include other meteorological treatises by Theophrastus, esp. his *De ventis*.⁸⁷ These observations are significant for the evaluation of IS and Qazwīnī as sources for the history of Theophrastus' *Meteorology* in Arabic: echos of this work in IS and Qazwīnī are in all probability *not* based on the Syriac-Arabic translations by Ibn al-Khammār and Bar Bahlūl, but on a Hellenistic compilation which adapted Theophrastean ideas in an Aristotelian framework.

Now, we shall give a synopsis of Theophrastean meteorological thoughts in IS and Qazwīnī:

Theophrastus	compare: <i>Ikhwān aṣ-ṣafā'</i> ⁸⁸	compare: Qazwīnī ⁸⁹
<i>Meteorology</i> , version of Ibn al-Khammār		
1,6-8 or 15-17	II 66,14-15 ⁹⁰	—————
1,18-20 or 6,39-41	II 66,15-17 ⁹¹	144,3-5: differs
5,2-4 ⁹²	II 66,3-4 (frgm.)	144,7-11

⁸² *Arab Meteorology* (see above); see his comparison of IS and Qazwīnī in ch. 6, especially p. 168f.

⁸³ See ed. Fārūq Saʿd (Beirut 1978) p. 141,12f.

⁸⁴ See ed. by Khayraddīn az-Zirikhī (Cairo 1928) II p. 63,2ff.

⁸⁵ See above and the synopsis below.

⁸⁶ See St. p. 40, n. 4; 78f.; 190 and W.St. p. 36,52 and 54.

⁸⁷ Cf. St. p. 77-80.

⁸⁸ Edition see above.

⁸⁹ Edition see above.

⁹⁰ Cf. Reitzenstein p. 22; St. p. 190; W.St. p. 36.

⁹¹ Cf. preceding note.

⁹² Cf. Aristotle, *Meteor.* II 9.369b7-11. Here, it is not clear whether IS and Qazwīnī are based on Aristotle or on Theophrastus.

224 Theophrastus

6,39-41: s. 1,18-20		
6,85-91	II 67,7-9	144,6-7: differs, other examples
7,2-5	II 64,16-20 ⁹³	139,14-15: shortened ⁹⁴
	II 65,4-5	139,18-19
7,7-9	II 65,19-20 ⁹⁵	—————
9,4-5	II 65,6-7 ⁹⁶	139,19-20
13,2-3	II 62,11-12	140,18-19 ⁹⁷
13,4-5	II 62,13-14 ⁹⁸	—————
13,8-10	II 62,9-10	—————
13,3-4;8-14; 18-21 (3 winds)	II 62,17-19(frg.)	140,21-141,5 (more)
13,45-50 (hurricane)	II 63,2-3(frg.)	141,6-14 (more) ⁹⁹
14,14-17	II 55,5ff.	—————
<i>De ventis</i> III and VI ¹⁰⁰	II 62,9-10	140,17-18

As we have already explained, we cannot derive from this synopsis any information on the history of Theophrastus' Syriac-Arabic *Meteorology* in Arabic meteorological literature. The only Arabic source which refers to Theophrastus' Syriac-Arabic *Meteorology* is Ibn al-Khammār's treatise on atmospheric phenomena. If we accept Ibn al-Khammār as translator of Theophrastus' Arabic *Meteorology*, its existence in the 2nd half of the 10th century appears all the more plausible as Arabic sources before that time do not show any influence of this translation. From the *Rasā'il Ikhwān aṣ-ṣafā'* it becomes evident that their knowledge of Theophrastus' *Meteorology* was confined to scattered ideas perhaps taken from a late Hellenistic meteorological compilation which combined Theophrastus and Aristotle¹⁰¹. Such a compilation was surely not the only source for the spread

⁹³ Translated Reitzenstein p. 17f., col. b; IS has additional material not in Theophrastus' *Meteorology*. As in Qazwīnī, we find additional Theophrastian material which is not in Theophrastus' *Meteorology*. Cf. Strohm, *Zur Meteorologie* p. 420f.

⁹⁴ Included in translation Reitzenstein p. 17f., col. a.

⁹⁵ Translated Reitzenstein p. 18f., col. b.

⁹⁶ Translated Reitzenstein p. 21; W.St. p. 54. —Cf. a similar passage already in Aristotle, *De generatione animalium* 735b2.

⁹⁷ In Qazwīnī there follows an additional passage on which cf. Theophrastus, *De ventis* I and V and St. p. 78, n. 3.

⁹⁸ Translated Reitzenstein p. 17 col. a.

⁹⁹ Cf. Strohm, *Zur Meteorologie* p. 421ff.; St. p. 78f. —In Qazwīnī there follows a chapter on winds which is inspired by Theophrastus' *De ventis* (see St. p. 79f.) and which cannot be found in IS.

¹⁰⁰ Cf. St. p. 40,78; on this generally accepted definition of wind cf. commentary ch. 13.

¹⁰¹ On this tendency to combine Aristotle and Theophrastus cf. some preliminary remarks also in Daiber, *Kompēdium* p. 85 and 87ff.

of Theophrastean meteorology in late antiquity and during Islamic times. We should also think of Nicolaus Damascenus' Compendium of Aristotle's *Meteorology*¹⁰² and *De plantis*¹⁰³ or of ps.-Aristotle, *De mundo*¹⁰⁴, and *Problemata physica*¹⁰⁵.

VI. EDITION AND ENGLISH TRANSLATION OF THEOPHRASTUS, *METEOROLOGY*, ARABIC VERSION BY IBN AL-KHAMMĀR

Our edition of the Arabic text is based on seven mss., three mss. with the complete text, **H**, **A** and **R**, from the 17th, 17/18th and 19th century respectively, and four mss. containing the text up to ch. 6,28 and ascribed to Ibn Sīnā (Avicenna), **B** from the 18th (**B**), and **S**, **Ra** and **Ru** from the 19th century. The Avicenna-fragment was published in 1934 in Hyderabad, based on a ms. from Rampur which we can identify with **Ra** and which the editor (ʿAbdallāh Ibn Aḥmad al-ʿAlawī) compared with a ms. from Hyderabad¹⁰⁶.

All mss., those with the complete translation and those with the fragment ascribed to Avicenna, contribute to the reconstruction of the Arabic text. The three mss. with the complete text have common mistakes against the Avicenna-fragment, while the Avicenna-fragment requires corrections as compared with **H A R**.

At the same time, **B** and **S** have better readings against **Ra** and **Ru** and even against **H A** and **R**. Moreover, they both have the tendency to replace words by other expressions, and by doing so they introduce mistakes: e.g. *tafarraqa* in Kha 4,6 is misread as *tagharraqa* and replaced by *ghamasa fī l-māʿ*. Remarkable is a long addition after Kha 6,16 which includes a paraphrase of the passage Kha 6,85-91. Finally, common omissions diminish the value of **B** and **S**. Both can be corrected by a comparison with **Ra** and **Ru** and with the complete version in **H**, **A** and **R**. In addition, **B** and **S** differ from each other and must go back to

¹⁰² Syriac translation preserved in ms. Cambridge Gg 2.14.; cf. Daiber, *Kompendium* p. 21, n. 18.

¹⁰³ Book II; see edition and translation by H.J. Drossaart Lulofs, *Nicolaus Damascenus, De plantis, Five Translations* (Amsterdam, Oxford, New York 1989 = Verhandelingen der Koninklijke Nederlandse Akademie van Wetenschappen, afd. Letterkunde, n.r., d.139), p. 186f. nr. 148 and p. 186f. nr. 175 (condensation of vapour in a bathroom on which cf. Kha 7,7-9); p. 186f. nr. 178 and 188f. nr. 179 (the comparison of snow and foam which both contain air; on this cf. Kha 9,4-10).

¹⁰⁴ See below comment on Kha ch. 15, 28-35. —On the Syriac-Arabic translations of *De mundo* cf. David Alan Brafman, *The Arabic De mundo: an edition with translation and commentary*. Thesis Duke University 1985.

¹⁰⁵ Cf. the books 25 and 26 which had already been used by Strohm in his analysis of Theophrastus' doctrine of winds (*Zur Meteorologie* p. 258ff.). These books are not translated into Arabic; see the forthcoming edition of the Arabic and Arabic-Hebrew translations of the *Problemata physica* by L. Filius (a preliminary edition with Dutch translation appeared in 1989 as thesis of the Free University Amsterdam).

¹⁰⁶ In Andhra Pradesh Government Oriental Manuscripts Library and Research Institute, the former Āṣafiyya Library. This ms. was not available to us.

226 Theophrastus

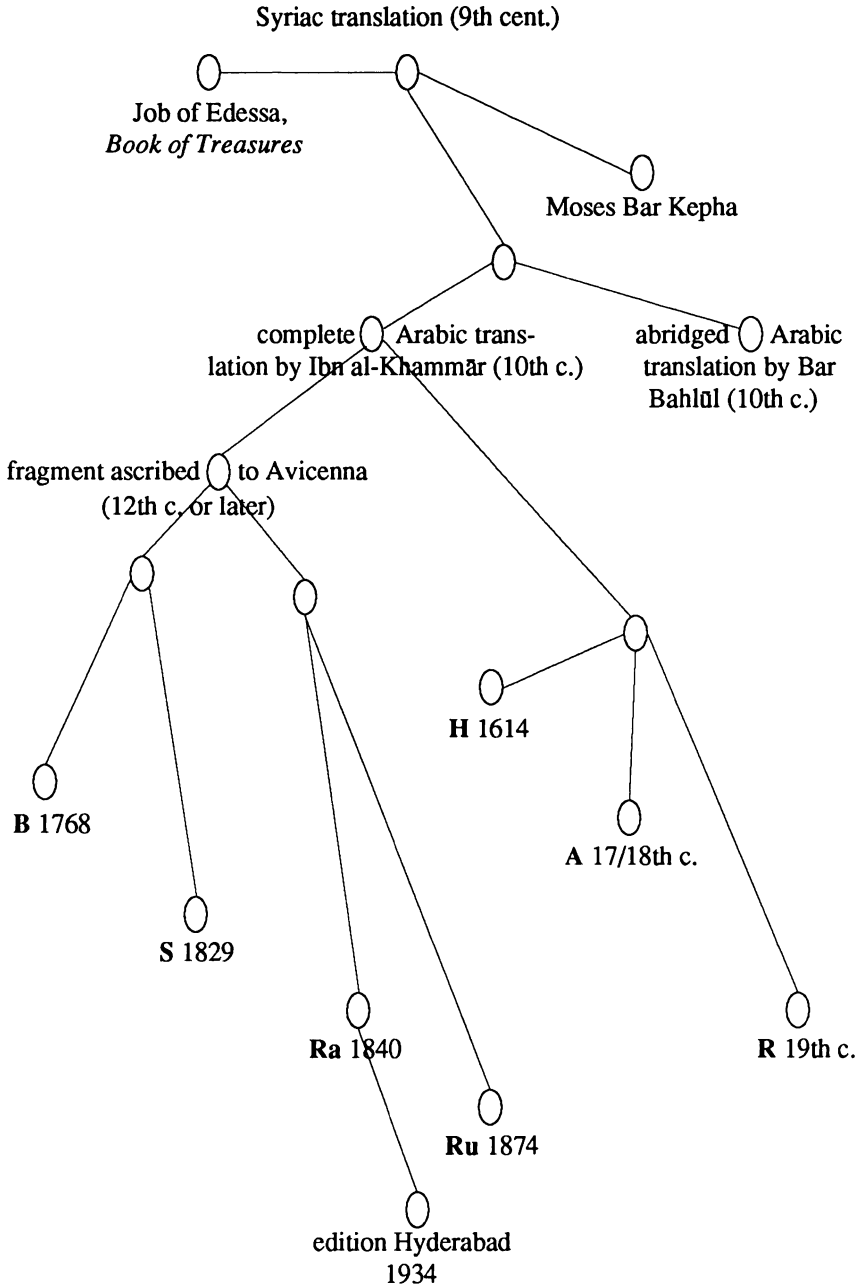
a common archetype; the same is true of **Ra**, **Ru** and **H**, **A**, **R**.

Because all Arabic mss. have mistakes, the Syriac transmission—as preserved in the Syriac ms. from around 1400, in the excerpts by Moses Bar Kepha (9th century), and even in the abbreviated translation by Bar Bahlūl—becomes an indispensable tool for examining and correcting the Arabic version by Ibn al-Khammār.

In one single case the translations by Bar Bahlūl and Ibn al-Khammār share a mistake, the reading of *aw* instead of *wa-lā* (Kha 4,4). This mistake might be caused by a common Syriac *Vorlage*. The Syriac ms. is incomplete here, but the correct reading can be found in the excerpt of Moses Bar Kepha¹⁰⁷.

¹⁰⁷ See above section III.

Stemma of the Arabic Manuscripts



H 309v

بسم الله الرحمن الرحيم وبه نستعين ،

Syc 351a

قول ثاوفرسطس في الآثار العلوية ،

[1] ذكر اسباب الرعد ،

نقول : إنّ الأرعاد تكون من أسباب سبعة : السبب الأول
منها اذا تصادمت غمامتان جوفوان فقرعت إحداهما الأخرى ،
ونظير ذلك ما نجده عندنا أنّا إذا فرغنا أيدينا وصكّكنا
الواحدة منها بالأخرى كان لذلك صوت شديد ،

5

السبب الثاني : إذا دخلت في غمامة جوفاء ريح فدارت فيها ،
ونظير ذلك ما نجده عندنا أنّه إذا هبّت ريح فدخلت في
المغاير والخوابى كان لها صوت ،

السبب الثالث : إذا ما سقطت نار في غمامة رطبة فطفئت ،
ونظير ذلك ما نجده عندنا أنّ الحدّاد إذالقى الحديد المحمى
في الماء جاء له صوت شديد ،

10

السبب الرابع : إذا قرعت الريح غمامة عريضة جليدية قرعا
شديدا ، ونظير ذلك ما نجده عندنا أنّ الريح إذا قرعت
القرطاس جاء لها صوت عظيم ،

السبب الخامس : إذا ما دخلت الريح في غمامة مطاولة
ملتوية مجوّفة ، ونظير ذلك ما نجده عندنا أنّ
القصابين إذا نفخوا المصارين سمع لنفوذ الريح فيها صوت ،

15

السبب السادس : إذا ما احتقنت ريح كثيرة في غمامة
مجوفة وانفتقت ، ونظير ذلك ما نجده عندنا أنه إذا ما
20 نفخت مائة ونقبت جاء لها صوت شديد عظيم ،

السبب السابع : إذا ما احتكّت غمامات خشنة بعض
ببعض ، ونظير ذلك ما نجده عندنا أن الرحي إذا حاكّ
بعضها بعضا جاء لها صوت شديد ،

فمن هذه الأسباب التي ذكرنا تكون الأرعاد ، فإن شكّ شاكّ
25 وقال : كيف يمكن أن يكون من الغمام صوت إذ ليست
بصلبة مثل الحجارة والأخفاف بل هي متخلخلة شبيهة
بالصوف والصوف لا يكون منه صوت لأنه إن قرع انسان
جزز صوف بعضا ببعض لم يكن لها صوت - قلنا : إنّنا نحن
أيضا لم نقل إنّ الغمام يكون فيها الصوت لأنها صلبة
30 شبيهة بالحجارة بل نقول : إنّ الغمام وإن كانت
متخلخلة منشقة فإنّ فيها إمكانا لإعطاء الصوت الكثير
كما أنّا نرى فيما نشاهد من الأشياء أشياء صلبة ولا يكون
لها صوت مثل قدر الطين والرصاص ، وذلك لأنّ هذه الأشياء
ليس فيها الاسباب المولدة لإعطاء الصوت / الكثير ومن
35 الأشياء أشياء متخلخلة لها صوت شديد مثل الماء والورق
اليابس ، وأما الصوف فإنه إذ كان متخلخلا لا يعمل صوتا
لأنه متخلخل بل لأنّ الاسباب المولدة للصوت ليست
بموجودة فيه ، وهذا جوابنا في هذا الشكّ ،

[2] ذكر أسباب البرق

وأما البرق فإننا نقول إنه من أربعة أسباب : السبب الأول
 منها والثاني على جهة القرع والاحتكاك ، ونظير ذلك ما
 نجده عندنا أنّ الحجارة إذا قرع بعضها بهضا خرج منها
 النار ، والخشب إذا حكّ بعضه ببعض إشتعلت منه النار
 كما أنا نجد الذين يأوون القفر يقدحون النار بحكّ
 الخشب بعضه ببعض ، وذلك يكون إما لأنهم يحمون الهواء
 الذي فيما بين الخشب ويحولونه الى النار وإما لأنهم يثيرون
 ما في ذلك الخشب من اجزاء النار ويخرجونه ، والسبب
 الثالث إذا طفئت نار في غمامة رطبة أنسرج اللطيف منها ،
 ونظير ذلك ما نجده عندنا / أنّ الحدّادين إذا غمسوا الحديد
 المحمى في الماء انسرجت منه نار ، والسبب الرابع : إذا كان
 في الغمامة نار كامنة وانضغطت الغمامة وانعصرت أو
 تفرقت وتقطعت ، ونظير ذلك الإسفنج وجزز الصوف التي
 فيها الماء : قد يخرج منها الماء إذا انضغطت وإذا تفرقت ،
 فكذلك الغمامة أيضا إذا تكاثفت وانعصرت وإذا تخلخلت
 وتقطعت خرج منها البرق ، فهذه الاسباب التي يمكن أن
 يكون البرق منها ،

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Syc 351b

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[3] ذكر أسباب الرعد الكائن بلا برق ،

أما الارعاد فتكون في بعض الاحايين بلا ابراق لثثة اسباب :

إما لانه ليس في الغمام نار كامنة وإما لأنّ فيها نارا الا
 أنها يسيرة لا تجزي لعمل البرق وإما أن تكون كثيرة الا
 5 أنها لا تستطيع الخروج لكثافة الغمامة ، فإنّ ذلك إذا كان
 كذلك حدث الرعد لقرع الغمام واحتكاكها ولم يحدث البرق ،

[4] ذكر أسباب البرق الكائن بلا رعد ،
 وأما البرق فيكون بلا رعد لعلّتين : إما لأنّ قرع الغمام
 واحتكاكها يكون يسيرا فتزلق النار وتخرج ويكمن الصوت
 وإما لأنّ الغمام تتخلخل ولا تتكاثف فيخرج ما فيها
 5 من النار فيتولد برق ولا يتولد صوت ، ونظير ذلك
 الإسفنج : إذا تفرق وإذا عصر خرج ما فيه من الماء ولم يكن
 لذلك صوت ،

[5] ذكر الأسباب التي لها يسبق البرق الرعد ،
 والبرق يسبق الرعد لعلّتين : لأنّ النار تخرج من الغمام
 اسرع ، لأنّ البرق والرعد يكونان معا إلا أنّا نحن نرى البرق
 اسرع مما نسمع الرعد ، ونظير ذلك أنّا إذا رأينا من بعيد
 5 انسانا يشقّ حطبا ونحن نعلم أنّ الصوت / يكون مع
 الضربة فإنّا نرى الضربة اولا ونسمع الصوت بآخره ، وذلك
 لأنّ البصر يتأدّى الى الناظر اسرع من مجئ الصوت الى
 السمع ، فهذا قولنا في الأبعاد والأبراق ،

[6] ذكر أسباب الصواعق ،

وأما الصواعق فإننا نقول فيها هذا القول : نقول أولا إنّ الصاعقة إما نار ريحية إما ريح نارية ، وذلك أنها إذا وقعت على الخشب احرقته وألهبته وإذا وقعت على الذهب أو الفضة صبّته وأذابته ، وهذه الأفعال من أفعال النار ، ثم نقول بعد ذلك إنّ الصاعقة وإن كانت نارا فليست بالنار الجمرية بل نارا لهابية ، وذلك انها اذا سقطت على الأرض لم توجد جمره بل يرى ذلك الموضع الذي تقع فيه الصاعقة كثير الدخان مقلعا ، وهذه من خواصّ النار والريح ،

5

والصاعقة ايضا الطف من جميع النيران اللهبية التي عندنا ، وذلك لأنّ النيران التي عندنا لا تنفذ في الحيطان ولا في الأرض ، والصاعقة تنفذ في كل جوهر محسوس وهى لا تبصر لأنها تفوت ابصارنا للطفافة التي فيها ولذلك ليس يرى الصاعقة احدٌ ولكن أفعالها تبصر وهى لا تبصر للطافتها ، ولسرعة حركتها صارت سرعتها تجاوز الوقت الذي يمكن أن يكون فيه البصر ، والصاعقة تكون لعلتين إما إذا كمنت في الغمام نارٌ وأفلتت بغتة وإما إذا كمنت في

10

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Syc 352a

الغمام ريح والتهبت لدورانها واحتكاكها بالغمام / وشدة خروجها بغتة ومجيئها إلينا وصارت نارا كما نرى ذلك في الرصاص إذا رمى بالمقلع فإنه يسخن بمحاكة الهواء ويلتهب وينوب ، والصاعقة تتولد إما في غمامة عظيمة

20

وإما في غمامات كثيرة صغار : إذا اجتمع بعضها الى بعض
 صارت منها صاعقة واحدة ، وكما أنه يكون من عيون
 كثيرة نهرٌ واحد إذا اجتمع الماء الخارج منها الى موضع
 واحد كذلك تكون من غمامات كثيرة وإن لم تكن غظاما
 صاعقة واحدة إذا اجتمعت النار الخارجة من كل واحدة من
 الغمام والتفت وصارت واحدة ، فعلى هذه الجهة تتولد
 الصاعقة ، / وأما خروج الصاعقة من الغمام التي النار
 متكمنة <فيها> فيكون إذا انقطع الغمام كما أن المئانة
 30 والرقّ إذا وطئ وانفقاً خرجت منه الريح المحتبسة فيه ،
 والغمام كانت تنقطع إما من قبل شيء يضغطها <من خارج
 مثل البرد او الريح المقطعة او من قبل شيء يقطعها> او
 يمدّها من داخل مثل النار والريح ، ونظير ذلك مما
 نجده عندنا أن المئانة تنفقي إما إذا انضغطت من خارج
 35 وإما إذا انتفخت من داخل انتفاخا شديدا او تأكلت
 وانقطعت ، وأما مجئ الصاعقة إذا خرجت إلينا فلعلّتين :
 إما لأن الغمامة تنشق في أسفلها وإما لأن بعض الزوابع او الرياح
 / يضربها في فوق ، ونظير ذلك مما نجده عندنا أن السهم
 إذا ضرب الترس فرجع بحمية شديدة وأيضا إذا شقّ رقّ منفوخ
 40 من أسفل كان خروج الهواء المحتبس فيه من ذلك الشقّ الى
 أسفل بغتة ، أما السبب في انشقاق الغمام من أسفل لا من
 فوق فهو أن البخارين المتصاعدين من الأرض هما متصلان

end frg.
ps.Avic.

H 311r

اعني البخار الغليظ والبخار اللطيف ، اذا صعدا الى فوق
 فإن اللطيف منهما لأنه يقرب من موضعه الطبيعي يتحرك
 الى فوق اسرع ، وذلك لأن كل واحد من الاجرام كلما بعد
 عن موضعه كانت حركته اضعف وأطأ وإذا قرب من موضعه
 كانت اسرع واقوى ، ومن اجل ذلك البخار اللطيف كلما
 صعد الى فوق كانت حركته اسرع ولأن البخار الغليظ لا
 يستطيع أن يسرع الصعود الى فوق مثله يفترقان فيسبق
 اللطيف الغليظ ، وإذا افترقا وانفصل البخار اللطيف من
 الغليظ أظهر سرعة حركة الى فوق تامة ، والبخار الغليظ
 لأن معونة البخار اللطيف الذي كان يصحبه في الصعود
 الى فوق قد فاتته يأخذ طريقا آخر ويرسب الى أسفل ،
 ولأن كثرة الهواء الذي تحته والرياح والبخار المتصاعد من
 الأرض يمنعونه من النزول وهو في ذاته يتحرك / الى
 أسفل والرياح والبخار وكثرة الهواء يمنعونه يتلبد
 ويجتمع فيصير غاما ، وليس هذه الحركة فقط تلبده وتجمعه
 بل قد يفعل به ذلك البرد المفرط عليه من قبل مفارقة
 البخار اللطيف الحار له ، ومن أجل ذلك الاجزاء الفوقانية
 من اجزاء الغمام أكثر تكاثفا وأكثر تلبدًا ، وذلك لأنها أكثر
 عدما لهذا البخار <الحار> ، وأما الاجزاء السفلانية فإنها تتحلل
 قليلا وتتبع لمكان البخارات الأخر الحارة التي تتصاعد
 فتخالطها ، ومن اجل ذلك إذا مدّت الغمامات الرياح المتولدة

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Syc 352b

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في داخلها انشقت وشققها لا يكون من فوق في المواضع
 المتكاثفة بل من اسفلها في المواضع المتخللة ، ونظير ذلك 65
 مما نجده عندنا أنه إذا انتفخت مthane غير متساوية
 الاجزاء انما تنشق اجزاؤها التي هي اضعف ، فإن طالبنا
 «مطالب» بالسبب الذي له تكون الصواعق اكثر ذلك في
 الربيع قلنا إنه يحتاج في كون الصواعق الى غمامات
 ورياح ونار ، وفي الشتاء الغمامات والرياح موجودة وأما 70
 النار الكثيرة فليست بموجودة لمكان البرودة المفرطة ، وفي
 الصيف النار الكثيرة موجودة وأما الغمامات فمعدومة ،
 وأما في الربيع فلأنه زمان وسط معتدل قد توجد فيه نار
 مجزية وغمامات ورياح ، فإن طالبنا ايضا مطالب بالسبب
 الذي يكون له الصواعق اكثر ذلك / في المواضع العالية قلنا 75
 إن ذلك يكون لعلتين : أما الاولى فلأن المواضع العالية فيها
 رياح وغمامات كثيرة والصواعق من هذه تكون ، والثانية لأن
 هذه المواضع اقرب من الغمام والمواضع السفلية فهي بعيدة
 من الغمام ، ومن اجل ذلك قد تبلغ الصواعق الى
 المواضع العالية قبل أن تتبدد ولا تبلغ المواضع السفلية 80
 لأنها تنحل قبل ذلك ، وكما أنا إذا رمينا مدرة طين
 من موضع مرتفع إن كان الارتفاع يسيرا نزلت المدرة
 سليمة وإن كان كثيرا تبسدت ، كذلك تجي الصواعق الى
 المواضع العالية لأنها اقرب من الغمام ولا تجي الى المواضع

السفلية لأنها تنحلّ قبل ذلك ، وإن طالبنا أيضا مطالب : أما
السبب الذي له إذا وقعت الصاعقة على كيس فيه دنانير
لم تؤثر في الكيس وأثرت في الدنانير وأذابتها - قلنا
إنّ الكيس متخلخل يعطي الصاعقة طريقا لنفوذها ، وأما
الدنانير فلأنها متكاثفة لا تجعل لها مجازا من اجل ذلك
تقف عليها حمية الصاعقة ، ولهذا السبب لم تؤثر في
الكيس وأثرت في الدنانير وأذابتها ، فهذا ما أردناه من
القول في الصواعق ،

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[7] ذكر اسباب الغيوم ،

وأما الغمام فإنه يكون من علّتين إما من اجتماع الهواء
وغلظته واستحالاته الى طبيعة الماء إما من بخار كثير
يتصاعد ويختلط به ما يتصاعد من أبخرة البحور ومن سائر
الرطوبات ، أما اجتماع الهواء وغلظه <ف> يكون من علّتين
وإما من البرودة وإما من رياح متضادة تضغطه وتجمعه ،
ونظير ذلك مما نجده عندنا أن البخار المتصاعد في
الحمام إذا لقي السقف ولم يمكنه النفوذ فيه لتكاثفه
اجتمع وصار ماء ، وأما الغمام والسبب في أنه يطفو فوق
الهواء وهو أثقل من الهواء فذلك لثلاثة اسباب: احدها لأن
مقدار الهواء الذي تحت / الغمام كثير ومن اجل ذلك لا يمكن
ثقل الغمام أن يقهره ، ونظير ذلك مما نجده عندنا أن

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الانسان إذا غمس يده في الماء او في الدهن ثم في الرمل
 بعد ذلك وعلقها منكبّة لم ينزل الماء ولا الرمل الى
 الأرض ، وليس ذلك بشيء من الاسباب الا أنه ليس 15
 يمكنهما لقلّتهما أن يعليا الهواء بثقلهما وينزلا ، ومن
 أجل ذلك إن كان مقدارهما اكثر من ذلك قليلا نزلا ، وكذلك
 أيضا الغبار قد يمكث معلقا في الهواء وقتا كثيرا لا ينزل
 لهذا السبب بعينه ، والخشب أيضا يطفو على الماء اذا
 كان كثيرا ، وأما إذا كان الماء قليلا فإنه يرسب فيه ، ولا 20
 نقول إنّ ذلك يكون لموضع الهواء المداخل للخشب ، فانك إذا
 دخلت في الماء أيضا إناء مملوءا وغمسته فيه الى رأسه
 وجدت ذلك / بعينه يعرض ، والسبب الثاني لأنّ الغمام
 ذاهب سيار وكما أنّ السهم ذاهب الى جانب لا يسقط الى
 الأرض كذلك الغمام أيضا إذا سار الى الجوانب لم يسقط 25
 الى الأرض ، والسبب الثالث أن الغمام لا يستطيع النزول
 لموضع البخار والريح المتصاعدة من الأرض ، والغمام
 يستحيل الى الماء إذا غلظ غلظا كثيرا وغلظه يكون إما
 من ضغط الرياح الصعبة وإما من البرودة ،

H 312r

[8] ذكر أسباب اختلاف الامطار ،

وأما الامطار الشديدة فتكون إذا عصرت الغمامة وجمعتها
 رياح صعبة جدّا ، وأما الامطار المتصلة فتكون إذا تصاعدت
 من البحور والأرض بخارات كثيرة ،

[9] ذكر أسباب الثلج ،

وأما الثلج فيكون إذا جمدت الغمام البرودة قبل أن يستحيل
الى الماء وقبل أن يتصل بعض الماء ببعض ما دام متشتتاً
منقسماً بقطرات صغار جداً يفرق بينها الهواء لأننا قد نجد
عيانا أن في الثلج هواء محتبسا كثيرا ، والدليل على ذلك
رخاوته وأنه إذا انعصر باليد قلّ مقداره وأنه إذا
انحلّ وصار ماء خرج من المقدار الكثير منه مقدار من
الماء يسير ، والسبب في بياض الثلج كثرة ما فيه من
الهواء ، والدليل على ذلك أننا نجد جميع الاجرام التي فيها
هواء كثير محتبس بيضا مثل الرغوة والدهن المضروب
بالماء والمنى ،

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[10] ذكر أسباب البرد ،

وأما البرد فيكون إذا استحال قطر الماء الكبار وجمد
بالبرودة ، وحبّ البرد يكون مدوّراً إما لأن حروفه تكسر
في انحداره فيملس وإما لأنه من عنصر في طبيعته ذي
شكل مستدير اعني الماء وإما لأن البرودة تجمده وتجمعه من
جميع النواحي بالسواء ،

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[11] ذكر أسباب الظلّ ،

وأما الظلّ فيكون إذ كان في الموضع السفلي في الهواء

الشيء الذي يكون فيه في الموضع العلوي عند كون الغمام والمطر وذلك أنه إذا غلظ الهواء في المواضع السفلية واجتمع أو تصاعدت بخارات فغلظت فيه من البرودة ينزل 5 الشيء الذي يغلظ لما فيه من الثقل لأنه ليس تحته من الهواء شيء كثير فيمنعه من النزول كما يمنع الهواء فوق لكثرة الغمام من النزول والقطر الصغير ،

Syc 353b

[12] ذكر أسباب الدmq ،

وأما الدmq فيكون إذا جمد الظل بالبرودة والسبب في بياض الدmq ما يداخله من الهواء لأن الشيء الذي هو فوق ثلج هو اسفل دmq والشيء الذي هو فوق مطر هو اسفل ظل ، 5 ومن اجل ذلك قد نقول إن الدmq يكون من جمود البخار المائي قبل أن يجتمع فيصير ماء ،

[13] ذكر أسباب الرياح المختلفة ،

H 312v

وأما الرياح فتكون من بخار مركب من اللطيف والغليظ ، والغالب عليها اللطيف ، / والرياح تتولد إما من فوق وإما 5 من أسفل وتولدها من أسفل يكون إما من الماء وإما من الأرض ، وذلك انا قد نجد الزوابع تسقط من الغمام من فوق والرياح تهب من أسفل من المياء ومن الجبال ، والريح تتحرك إما لخفتها إذا طلبت الموضع الاعلى لأنها على ما

قلنا بخار مركب والغالب عليه اللطيف وإما لأن الهواء
يجتمع ويتلبد في بعض الاوقات في الموضع الشرقي وفي
بعض الاوقات في الموضع الغربي والقبلي والبحري ، وإذا 10
اجتمع الهواء في ذلك الموضع وتلبد حتى لا يبقى هناك
موضع خال سار الهواء من الجانب «الواحد الى الجانب»
الآخر باضطراب الخلاء وجاء معه ببخار من الماء ومن الارض
لكيما لا يوجد موضع خال ، ونظير ذلك ما نجده عندنا إذا
وضعنا أنبوبا على سطح الماء وجذبنا الهواء الذي فيه 15
بمصنا له بالفم باضطراب الخلاء صعد الماء وملا الأنبوب
لكيما لا يبقى «فيه» موضع خال ، فعلى هذه الجهة تتولد الرياح
من اسفل ، وأما من فوق فإنها تتولد إما إذا انحل الماء
الفوقاني والغمام وصار ريحا وإما إذا تصاعدت من الأرض
بخارات كثيرة فصكّت الغمام او الهواء الدائر الفوقاني 20
ورجعت الى اسفل بغثة ، «...» والرياح تتحرك حركة معوجة ،
وأما الرياح الصعبة فتكون إذا تصاعدت بخارات كثيرة وأما
الرياح المتصلة الدائمة فتكون إذا اتصل تصاعد البخارات ،
أما الرياح الحارة والباردة فتكون بعلتين : وإما من قبل
المواضع التي منها تجيء وإما لأنه يكثر فيها في بعض الاوقات 25
البخار اللطيف الحار وفي بعض الاوقات البخار البارد
الغليظ ، وايضا الرياح التي تصعد من المواضع المرتفعة تجعل
الهواء يابساً لأنها تدفع عنه بحمية مجيئها البخار وقوام

الغمام الغليظ ، والرياح التي تنزل من المواضع السفلية تجعل
 30 الهواء رطبا لأن صعوبة حميتها تنحلّ قبل صعودها إلينا ،
 end Syc وهى لذلك لا تستطيع / أن تدفع عن الهواء شيئا ، ومن
 أجل ذلك الرياح الشمالية يابسة والرياح الجنوبية رطبة ،
 فإن طالبنا مطالب بالسبب الذي كانت له الرياح المسماة
 «اورس» تدفع السفن الى قدام دفعا شديدا وتجذب الغمام
 35 قلنا : أما أن يكون ريحان متضادتان الحركة تهبّان معا
 فالسفلية منهما التي نحو الارض تدفع السفن والعالية منها
 تدفع السحاب الى الجانب المخالف لهذا {ونحن نظنّ أنّ الغمام
 تنجذب بالريح التي تدفع سفن} وأما أن تكون ريح واحدة
 الا انها تعمل استدارات ودوائر ، ومن اجل ذلك تدفع السفن
 40 إذا استدارت وتجذب «السحاب» الى الجانب المخالف وتلجئها
 الى الحركة بخلاف حركة السفن ، فهذا / ما أردناه من القول
 H 313r في هذا ،

ونحن ذاكرون فرسطير فنقول إنّ فرسطير هو شبيه بعمود
 هوائي ينتهى من السماء الى البحر ويجتذب السفن الى
 45 فوق ، وإذا نزل الى الارض يسمى زوبعة ، فتكون إما إذا
 انتصبت بحذاء الريح غمامة مجوفة وامتدّت الى البحر تدفع
 الريح لها إما من ريح تندفع دفعا صعبا ، وهذه الزوبعة
 تجذب الماء والسفن الى فوق لأنّ الريح إذا صكت رجعت
 رجوعا عنيفا ويرجوعها ترفع الهواء ، فإذا ارتفع الهواء

صعد معه الماء والسفن لكيما لا يبقى موضع خال ، وهذه الزوبعة تدفع السفن التي تصعدها من غير أن تقسدها إذا لم تنقطع الريح بغتة وضعفت قليلا قليلا ، والسفن تهلك بها إذا ما انقطعت الريح بغتة من أى الاسباب كان وسقطت السفن من الريح بغتة سقوطا بعنف ،

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[14] ذكر اسباب الدائرة الكائنة حول القمر ،

وأما الدائرة حول القمر فتكون إذا غلظ الهواء وامتلأ بخارا حتى تحدث فيه من ضوء القمر حركة موجية كما انا نحن إذا القينا في الماء حجرا حدثت حول الحجر حركة مستديرة ،
 5 وأما لأن شعاع القمر إذا صادف الهواء غليظا لطف الموضع المحاذي للقمر ، وكلما لطف هذا الجزء من الهواء غلظت الأجزاء التي حوله أكثر ، ومن أجل ذلك يكون الهواء الغليظ الذي حول هذا الجزء الذي قد لطف دائرة ، ونظير ذلك أنه إذا نفخ انسان بانبوب في موضع فيه تراب نقى الموضع الذي ينفخ فيه واجتمع الغبار المنكنس منه في الموضع المحيط بالموضع النقي وعمل دائرة ، والدائرة حول القمر تنحل «أما» إذا هبَّت ريح صعبة وبددت الغليظ وأما إذا كان
 10 مطر ، فمن هذه الاسباب يكون كل واحد من هذه الاشياء ، وليس من الله تكون الصواعق ولا شيء ما ذكر ، وذلك أنه ليس ينبغي أن يجعل الله سبب تشويش العالم بل سبب

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تعديله وترتيبه ، وذلك لأننا نضيف تعديله وترتيبه الى الله عز وجلّ وتشويش العالم الى طبيعة العالم ، وبعد ذلك ايضا :
 إن كانت الصواعق تكون من الله فلاي سبب يكون أكثر ذلك
 في الربيع أو في المواضع العالية ولا يكون اكثر ذلك
 في الشتاء او في الصيف او في المواضع المنخفضة؟ وايضا :
 لأي سبب تقع الصواعق في الجبال التي لا تسكن وفي
 البحار وعلى الاشجار وعلى الحيوان العديم النطق؟ والله
 ليس بغضب على هذه ، وأعجب من ذلك ايضا أنه ربما
 انقضت الصواعق على الاخيار من الناس ومن يخشى الله
 ولا تقع على المعتدين / ومعلمي الشرّ ، فليس ينبغي أن
 تقول <في> الزوابع إنها تكون من الله ولا في شيء مما لنا
 في كونه مضرّة او مما ينقص الوهة الا أنه يكون على
 غير تعديل لكيما لا يلزم الله الشهادة الفانية وتدفع عنا
 الشهادة الملكية ،

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H 313v

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[15] ذكر أسباب الزلازل واختلافها ،

وأما زلازل الارض فتكون من أربعة أسباب : إما إذا كان في
 الأرض تجويف مثل المغار والكهوف وسقط ما هو فوقها
 عليها ، وذلك يسقط إما لأن الارض تجفّ وتفتّت وإما لأنها
 ترطب وتنحلّ ، ونظير ذلك مما نجده أنه إذا سقط من
 اسطوانة الحجارة حجر واحد وزال عن موضعه تزلزلت

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- الاسطوانة كلها ، وإما إذا كان في بعض تجويفات الأرض ماء محتبس وتحرك ذلك الماء لأنه يجد مخرجا ضيقا او لسبب آخر زلزل الأرض كما تزلزل السفينة الموج ، وإما إذا كانت في جوف الأرض ريح كثيرة محتبسة فإذا نفذت هذه الرياح في مسلك ضيق زلزلت الأرض ، ومن اجل ذلك ربما كان مع الزلازل اصوات ، وإما إذا كانت في بطن الأرض نار كثيرة محتبسة فلطفت الهواء الذي في ذلك البطن من الأرض وحلته وخلخلته طلبت موضعا اكبر ، ومن اجل ذلك إذا شقّ الأرض وخرج زلزلها ، ومن هذه الاسباب ينبغي أن يتوهم أنّ الزلازل تكون ، وأما السبب الذي له تكون الزلازل في وقت عدم الرياح اكثر فإننا نقول فيه إنّ في وقت عدم الرياح تحتبس الرياح في باطن الأرض ولا تنفذ في تجويفاتها فتكون لذلك الزلازل ، وأما إذا هبت ريح كثيرة فلأنّ الرياح حينئذ لا تكون محتبسة في تجويفات الأرض بل تكون نافذة لا تكونن زلازل ،
- فإن طالبتنا مطالب بالسبب الذي <له> لا تكون الزلازل في بعض المواضع من الأرض قلنا إنه ليس في هذه المواضع تجويف او فيها تجويف الا أن الأرض عليه حارية او ليس فيها ريح ،

فإن طالبتنا مطالب بالسبب الذي له صار بعض زلازل الأرض اختلاجية وبعضها مائلة ومنقلة الميلان وبعضها مائلة فقط

قلنا إنّ الزلازل الاختلاجية تكون إذا سقطت التجويفات
 التي في الارض ، ونظير ذلك أنه اذا سقط من اسطوانة
 الحجارة حجر واحد تحركت الحجارة الباقية حركة اختلاجية ،
 30 وأما الزلازل التي تكون مائلة ومنقلة الميلان إذا خرجت
 ريح فصكت موضعا في الأرض صكّا عنيقا ، والزلازل تكون
 مائلة فقط إذا صكت الرياح ولم ترجع إما لأنها تتصل
 بالهواء وإما لأن قوتها تضعف / قبل أن تصل موضعا آخر
 H 314r
 35 من الارض ،

تمّ قول ثاوفرستس في الآثار العلوية ،

والحمد لله على ما سدّد وعلم وصلواته على سيدنا محمد
 وآله الطيبين الطاهرين ،

Ibn al-Khammār. Arabic apparatus

superscriptio,1 وبه نستعين : A R B S Ra Hy – : حامدا ومصليا
 ومسلما Ru / superscr.,2 قول : R – / قول ... العلوية : هذه
 رسالة في B S Ra Ru / 1.1 الرعد : + والبرق للشيخ الرئيس
 قدسه (قدس سره S) B S : + وغيره منتسبة الى الشيخ الرئيس
 ابي علي رضه (Ru –) Ra Ru Hy / 1.2 يقول Ra Ru Hy / يكون
 : H A R B S Ra Ru (3.p.et al.loc.et verbis) / السبب الاول :

الواحد Ra Ru Hy / 1.3 منها : + انها S / تصادمت B S Ra Ru
 Hy : صادمت (صادفت؟) H : صادفت A : صارت R / جوفواوان
 H A R : جوفان Ra Ru Hy : مجوفتان B S / فقرعت :
 يقرع B S Ra Ru Hy / احديهما H A R Ra Ru : احدهما B S
 correxi / 1.4 انا : - B Ra Ru Hy : انها S / فرغنا H A R
 (بدمج cf. Syc 351a4) : نزعنا B S Ra Ru Hy / صككتنا A :
 وصلكتنا R / 1.5 الواحدة : احدهما B S : - Ra Ru Hy / منها :
 - Ra Ru Hy / كان : + يحصل B S / لذلك : من ذلك B S / 1.6
 والسبب B S Ra Hy / في جوف غمامة B S / 1.7 ما : مما S Ra
 B / عندنا : عيانا B S Ra Ru Hy / انه : انها B S Ra Ru Hy /
 فدخلت : - B S / 1.8 المغارات BS : المغارى (sic) Ru : المغارة
 Ra : Hy partim ras. / والخابئ : والخابئ R H : والحوالى A :
 ولامكنة (sic) الخالية الضيقة B S : والجوانى Ra Hy : والخوانى
 Ru : correxi (cf. Ba 1,7) / 1.9 والسبب B S Ra Hy / ما :
 - B S Ra Ru Hy / رطبة : ras. RA : مرطبة Ru / 1.10 عندنا :
 عيانا B S Ra Ru Hy / لقي Ru / المحماة Ru / 1.11 جاء : كان S
 B Ra Ru Hy / 1.12 والسبب B S / عرضية جليدة (Ra) : جديدة
 Ra Ru Hy / 1.13 عندنا : عيانا B S Ra Ru Hy / 1.15 ما :
 - B S Ra Ru Hy / دخلت (cf. Sy) B S Ra Ru Hy : حكت H R :
 حلت A / مطاولة H A R Ra Ru : طويلة B S : مطلولة (falso e)
 Ra Ru Hy / 1.16 ملتوية B S : مكوية H A R : ملونة Ra Ru Hy

/ عندنا : عيانا B S Ru Hy / 1.17 سمع : يسمع B S : جمع
 Ru (sic) / من نفوذ B S / 1.18 والسبب B S / احتقت : احتفت
 Ru : حنقت Ra (sic) : اختفت Hy / 1.19 وانفتقت B Ra Ru :
 وانفتقت H A R S / عندنا : عيانا B - Hy / عيانا...نجده (1.22)
 S - : انه B Ra Ru Hy - / ما (إذا post) B Ra Ru Hy - :
 / 1.20 نفخنا (+ في) B Ra Ru Hy / ونقبت : وفقت (= وفقت ؟)
 H A R : ثم ثقت B Ra Ru Hy /correxī : شديد H A R Ru Hy
 : + عظيم B Ra / 1.21 والسبب B / بعض يبعث : بعضها على
 بعض B Ra Ru Hy / 1.22 عندنا : عيانا B Hy (alteravit editor
 H A R / sec. al. loc. ut vid.) / الرحي B S Ra Ru Hy : الرجاء
 / 1.24 الاسباب (الانباء S) التي ذكرناها (+ يمكن ان) S Ra Ru
 B Hy / 1.25 ان يكون من الغمام : للغمام B S Ra Ru Hy /
 ليست : + هي B S Ra Ru Hy / 1.26 صلبة B S Ra Ru Hy
 1.27 منه : له B S Hy : لها Ra Ru / إن : اذا B S - : Ra Ru
 لو Hy (addidit editor ut vid.) / الانسان B S Ra Ru Hy /
 1.28 جزر صوف : اجزاء الصوف B S : حرر الصوف Ra Ru /
 بعضها : بعضها A R B S Ra Ru Hy (mrg.) H / 1.29 لم نقل :
 ليس (لا S) نقول B S Ra Ru Hy : لسنا نقول Hy / 1.30 يقول H Ru
 / ان الغمام : انها B S Ra Ru Hy / 1.31 منشقة : متسعة A R
 H : مشقة B S Ru : مشقة Ra Hy /correxī : 1.31 امكانا S
 B Ra Ru Hy : امكان H A R /الكثيرة S / 1.32 انا : + لا R /

اشياء : B - / صلبة : الصلبة B : ليست متخلخة S / ولا : انه
لا B : لا S Ra Ru Hy / 1.33 مثل قدر الطين : كقطعة من الطين
الرطب B S : قدر الطين Ra Ru Hy / وذلك A ras. : ذلك Ra Ru
/ 1.34 المولدة : المؤيدة Ra Ru Hy / الكثيرة S Ra / ومن : من
S / 1.36 اذ : اذا A Ra Ru Hy : ليس لما B : لما S / صوت A
H R / 1.37 لا لانه : الا انه لا B : لانه Hy / لا لانه ... بل : -
S / متخلخل A ras. : يتخلخل B / لان : ان B / 1.38 بوجود Ra
/ الشك : + والله اعلم بالصواب S Ra Ru Hy B / 2.2 الابرار S
B Ra Ru Hy / انه : انها تكون B S Ra Ru Hy / 2.3 منها :
post والثاني B S Ra Hy Ru / والاحتكاك B S Ra Ru Hy :
والاحتكال H A R / 2.4 عندنا H A R Ra Ru Hy : عيانا B S /
B S Ra Ru Hy خرجت / 2.6 انا : ان Ra / ياوون B S Ra Ru
Hy : ياوون H A R / يحك : يحك S / 2.7 الخشب : - S / بعضه
... في ذلك الحشب (2.9) : - Ru (homœotel.) / يحمون :
يجمعون Hy / 2.8 وإما ... النار (2.9) : Ra mrg. / يثيرون A
R : يثيرون H : يستثيرون B : يستثيرون S : يستصيرون Ra (sic)
: يستبصرون Hy / 2.9 ما : - B / يخرجونها B S / 2.10 الثالث
B S Ra Hy : الثاني H (ut vid.) A R / انسرج : فاستبرج B :
واستبرج S Ra Hy Ru / 2.11 عندنا : عيانا S / غمسوا S Ra Ru
B Hy : غمس H A R / 2.12 الماء : النار S / انسرجت :
استبرجت B S Ra Hy Ru / منه : منها B S Ra Ru / الرابع : -

S Ra Ru Hy الغمام (1. loc.) 2.13 / B S Ra كانت / R
 S Ra كامنة : متكمنة B S Ra Ru / Hy فانضغطته
 B Ru Hy / او تفرقت وتقطعت : - B : ظهرت تلك النار S : او
 تفرقت Ra Ru Hy / 2.14 وجزز H A R Ra Ru : وقطعة من B S
 2.15 فيها : فيه S / واذا تفرقت : وانعصرت S / 2.16 كذلك B :
 كل S : ولذلك Ra Ru : وكذلك Hy / الغمام B S Ra Ru Hy / واذا
 تخلخلت وتقطعت : - B S : واذا تحللت وتقطعت (وانقطعت Ru) Ra
 Ru Hy / 2.17 الاسباب : + هي B / 2.18 منها : + والله ولي
 التوفيق B S : + ومن الله التوفيق Ra Ru Hy / 3.1 بلا برق :
 بدموق (?) R : بغير برق B S Ra Ru Hy / 3.2 فاما S Ra Ru Hy
 B / بعض A ras. / الاحاين : الاوقات B S Ra Ru Hy / ابراق :
 برق B S Ra Ru Hy / 3.3 كامنة : linea delevit A : متكمنة R
 Ra Ru : مستكنة (sic) Hy : + متكمنة A H (mrg) / نار Ra
 3.3-4 الا انها : - B S Ra Ru Hy / 3.4 تجزي : يجرى Ra Ru
 H A R : correat Hy : يكفي B S / بعمل B S Ru / وما : - R
 / ان : لانها B S Ra Hy / 3.5 الغمام B S Ra Ru Hy / 3.6
 حدث : حدوث Ra : حديث Ru / لقرع الغمام واحتكاكها : - B S
 يحدث (sic) الغمام واحتكاكها Ra Ru Hy / 4.1 احتكاكها H R
 الكائن بلا رعد : والرعد B : دون الرعد Ra : بدون الرعد Ru Hy /
 4.2 إما : - R : واما B / لان : لانه B / 4.3 واحتكاكها ... الغمام
 (4.4) : - Ra / فترلق (cf. Sym ܠܬܠܩܝܬܐ B S Ra Ru Hy :

فتبرق HAR / ويكن H A R S Ra Ru Hy : ويمكن B / 4.4 ولا
 : او 4,4 Ba mss. arab. et (cf. Sym $\alpha\lambda\epsilon$) / 4.5 ذلك
 : + $\alpha\lambda\epsilon$ $\alpha\lambda\epsilon$ (= ما نجده عندنا) Syc / 4.6 للاسفنج H A R
 / اذا : A ras. / تفرق (cf. Syc) H A R Ra Ru Hy : غمس في
 الماء (+ اجتمع فيه (S -) شئ كثير منه) BS / انعصر B S :
 اعتصر Ra Ru Hy / من : في H A R / 4.7 لذلك : كذلك R : له
 Ra Hy / 5.1 اسباب B S / لها : بها Ra Ru Hy / يستبق S /
 البرق الرعد HAR B Ra Hy : الرعد البرق S Ru / 5.2 والبرق يسبق
 الرعد : يستبق الرعد S / البرق B / لان : اما لان B S Ra Ru Hy
 / 5.3 لان : واما لان B S Ra Hy Ru / انا : ان Ra / بعيد : بعد
 Hy / 5.4 اسرع مما : قبل ان B S / 5.5 حطبا : + فانا نرى
 حركة اليد الضربة (للضرب S) اولا ثم نسمع الصوت بعده B S /
 مع Syc Sym B S Ra Ru; cf. Syc : من H : عن A R / 5.6 فانا :
 ونحن B S Ra Ru Hy / بأخره : آخرها B S : آخره Ra Ru Hy /
 5.7 لان : ان B Ra H / البصر (cf. Syc) H A R Ra Ru : المبصر
 B S Hy / يتأدى B S : يودى H A R Ru Hy : يُرى Ra / اسرع S
 B : سرع HAR / 5.8 قولنا : ما B S Hy : واما Ra Ru / 6.2
 واما : اما B Ra Ru : B Hy - / الصواعق : - S Hy / فانا H A
 S Ra Ru Hy : R B S Hy / هذا القول نقول اولا : - Ra Ru Hy
 B / 6.3 إما (2. loco) : A ras. : واما B S Ra Ru Hy / 6.4 على
 (1. loco) B S Ra Ru Hy : في HAR : + $\alpha\lambda\epsilon$ $\alpha\lambda\epsilon$ Syc / وإذا

: اذا Ra / ذهب Hy / 6.5 او الفضة : والفضة B S Ra Ru : او
 فضة Hy : + وسائر الفلزات B S / صبته واذابته H A R Ru :
 اذابته B S : صبته اذابته Ra : صلبة اذابته (e Ra ut vid.) Hy /
 6.6 إنَّ : B S- / نارا : نار B / بالنار : من قبل النار B S Ru - :
 Ra Hy / 6.7 بالجمرية Ra Ru Hy / النار الالهية B S Ra Ru :
 النار الالهية Hy / وذلك R / سقطت H A R Ra Ru Hy : وقعت B S
 / الارض (cf.Sy) B S Ra Ru Hy : النار H A R / 6.8 يرى :
 نرى B S Ra : روى Ru Hy / 6.9 كثير الدخان : محرقا B :
 محترقا S : كثيرا الدخان Ra Ru / مقلع H A R : correx
 منهدما B S : متقلعا Ra Hy : متصلعا (sic) Ru / من H A Ru Hy :
 R Ra : B S- / 6.10 النيران : النار Hy / الالهية : الملهبة B S :
 الالهية Ra Ru : الالهية Hy / 6.11 لان H A R Ru : ان S Ra Hy :
 B / 6.13 للطافة التي فيها : للطافتها B S Ra Ru Hy / 6.15
 ولسرعة : وبسرعة B S Ra Ru / تجاوز A R Hy : مجاوز H : مجاوز
 B S : محاور Ra Ru / الذي : + لا B / 6.16 البصر : للبصر Ru
 : + لان البصر يحتاج الى زمان حتى يثبت البصر (المبر : Hy - : S)
 B S Ra Ru Hy : + واما الصاعقة فانها ربح سحابية مشتعلة ليست
 بلطفية لطافة البرق الذي لاجله لا يبقى شعاع البرق زمانا يعتديه بل
 يطفأ بل هي (الذي لاجله ... بل هي : وهذه S) ربح سحابية مشتعلة
 تنتهي الى الارض لا ضوءها وحده بل جرمها المشتعل لاستحصانه
 (لاستحصافه B) ولاجتماع ثقله الارضى او لاضطراده (sic) الى

ذلك الماخذ والجهة فربما كانت رياحا سحابية (الارضى ... رياحا :
وهذه قد تكون S) ساذجة لتكون (فيكون S) صاعقة لطيفة وربما
كانت مؤثرة فيما يقوم في وجهها لكنها (وربما .. لكنها - S) تنفذ
(وتنفذ S) في الاجسام المتخللة ولا تحرقها ولا يبقى فيها اثر
وربما كانت اغلظ من ذلك فتنفذ في المتخلل نفوذا يبقى فيه أثر
سواد وتذيب ما تصادمه من الاجسام المتكاثفة ولذلك ما تذيب
الضباب المنصبة (المنسوبة S) على الترسة (البرية S) ونحوها المتخذة
من الفضة والنحاس ولا تحرق الترسة (البرنسية S) بل ربما سودتها
وكذلك تذيب الذهب في الصرة ولا تحرق الصرة الا ما تحرق عن
الذوب وربما كانت اشد (شرّ B) من ذلك وربما كانت سحابية
(سحابا S) زوبعية (نوبعة S) مشتعلة وتكون من مادة كثيفة فتكون
شئ (شر S) الصواعق وبالجملة فالصواعق رياح سحابية مشتعلة
وربما طفئت هذه الصواعق فتستحيل (وتستحيل S) اجساما ارضية
بحسب المزاج الذي يكون فيها واذا (اذ B) ارادت صاعقة ان تصعق
نفذ منها رياح في اكثر الامر B S (partim periphrasis t. arab.
6.85-91) / تكون : + وتحقيق (sic) B : + وتحصل S / لعلتين :
بعلتين Ra Ru / إما : وإما Ra Ru / 6.17 كمنت .. اذا : S Ra Ru-
B Hy / بغتة : بعة H A R : (حججـ Syc cf.) correxī / كمنت
(2.loco) : احتقنت B : حشفت (sic) S : اكنمت Ra Ru Hy /
6.18 الغمام : الغمامة B S / والتهبت : والترممت (falso e Ra) Hy
/ لدورانها واحتكاكها : لاحتكاكها B S Ra Ru Hy / بالغمام Ru Hy

/ B S منها + خروجها : 6.19 / B S بالغمامة : H A R Ra
 مجيئها B S Ra Ru Hy : لحيها (= لجيئتها؟) / H A R / وقد صارت
 نارا B S Ra Ru Hy : + واما بخار دخاني فبه (فيه S) دهنية
 وكبريتية (وكبريتية B) يشتعل بسرعة حركة اجزاء السحاب
 واحتكاكها او يشتعل بسبب اختناقه في جوف الغمامة B S / - 6.19
 21 كما ... وينوب : - B S / نرى : ترى Hy / 6.20 في : - Ru
 Ra Hy / للرصاص Hy / في المقلع Ra Hy / يسخن : يسكن Ru
 Ra Hy / بمحاكاة Ra Hy Ru : بمحاكاة H A R / 6.21
 والصاعقة : - Hy : + اما ان تكون واحدة وهي التي B / إما : - S
 B : إما ان (والصاعقة post) Ra Ru : واما ان Hy / غمامة :
 غاية (sic) Ru / 6.22 في غمامات ... اجتمع : ان تكون كثيرة وهي
 التي تتولد في غمامات كثيرة صغار ثم تجتمع اجزاؤها ويتصل B S
 / الغمامات (sic) Ru / 6.23 فصارت B S / منها فيها Ra Ru Hy
 / كما B S / من (cf. B S) Ra Ru Hy : في H A R / 6.23-25 من
 عيون ... واحد : النهر العظيم من الماء قد يتحصل من عين واحدة
 غريزة وقد يتحصل من عيون كثيرة صغار يجتمع الماء الخارج منها
 الى موضع واحد فيكون منها نهر عظيم. (periphras.) B S / 6.24
 نهر واحد : فهو (6.23 يكون post) Ra Ru : - Hy / 6.25-6.27
 تكون ... والتفت : قد تكون الصاعقة من غمامة واحدة عظيمة وقد
 تكون من غمامات كثيرة صغار تجتمع النار الخارجة من كل واحد
 منها ويلتقي بعضها ببعض B S / 6.25 من : A ras. / 6.26 النار

Ra Ru Hy (cf. B واحد : كل واحدة : كل واحد S Ra Ru
 6.27 / S) وعلى هذه الجملة Ra Ru Hy B S 6.27-28 / تتولد
 الصاعقة : - A : + وهذا ما اردنا ان نبين ومن الله التوفيق والهداية
 (Ra Hy -) والتحقيق (Ra Hy -) تمت الرسالة B S Ra Ru Hy
 / correx: H A R (finis frg. ps.Avicennae) 6.28 / من : في
 6.31 كانت : مات H R / في قبل H A R correx: H A R / «من خارج» ..
 يقطعها> : حـ لحـ كـ صـ مـ نـ هـ وـ زـ حـ طـ يـ قـ رـ كـ خـ غـ فـ
 : H A R 6.33 / Syc 352a12-13 تمددها HAR
 correx: H A R 6.34 / انضغطت : انقطعت H A R : correx
 H A R 6.38 / (cf. Syc 352a14) يضربها : يصلها H A R
 : Sym 195r a20 ; H A R 6.38 / (cf. Syc 352a17) corr.
 6,42 / وهو H A R : correx: H A R / من : مثل R / وهما H A R :
 correx: H A R 6.45 / فوق : - A / الاجرام : A partim ras. / بعد :
 R 6.52 / اللطيف : + من الغليظ (linea delevit) A / 6.53
 يأخذ : باحد H A R : correx: H A R 6.54 / ولأن : او لان H A R :
 (cf. Syc) / correx: H A R والريح والبخار : Syc /inv.ord. 6.61 <الحار>
 : H A R 6.62 / cf. Syc. 352b4 وتتبع : ويتسع A R (?) H :
 correx: H A R 6.66 / انتفخت R (mrg.) H : انصحت H(i.t.) : نفخت
 / A 6.70-72 واما النار ... موجودة : - A / 6.71 بوجود R
 6.73 معتلة H A R : correx: H A R / مجزية : محرقة H A R :
 6.78 /correx: cf. Syc 352b14 والمواضع : المواضع
 H A R : correx: H A R السفلية : H partim rasum / 6.79 في

الغمام H / 6.81 اذا : - A / مزرّة H : Syc / 6.83 تبدرت R
 / 6.88 طريق H A R : correxi / 6.90 تقف : تغمر H A R :
 / 6.91 ما : انا A (sine punctis) / 7.2 في اجتماع H
 : H A R / 7.3 كثيرة H A : correxi / 7.4 البخور H A R :
 / 7.5 وغلظ A / 7.6 في correxi / وفي سائر H A R : correxi
 البرودة A / متضادة : متصاعدة H A R : Syc. cf. correxi
 (ܡܡܥܬܐ) 352b31 / 7.7 نجده : - H R / 7.8 القى H A R :
 / 7.9 يطفوا H A R (etiam al.loc.) : correxi / 7.10
 احدها - R / 7.11 المقدار A / 7.12 نجده : - H A R / 7.16
 يمكنها لقلتها H A R : correxi / يغليا H : correxi / 7.24 السهم
 : السهام (+ لان الغمام) H A R : correxi / لا تسقط H A R :
 / 7.26 السبب R / 7.28-29 اذا غلظ ... البرودة : - A
 / 7.29 في برودة H : correxi / 8.1 اسباب : باب R / 8.2 واما
 : H ras. / 8.3 واما : - R / 9.1 اسباب : باب R : A ras.
 9.3 الى الماء : + ܡܡܥܬܐ ܡܡܥܬܐ Syc 353a19 / ما دام : A ras.
 / 9.4 بينهما H A R : correxi / 9.5 محتبس كثير H R A :
 / 9.6 مقدار A / 9.7 المقدار H A R : correxi :
 مقدار A / 9.8 من : في HAR / 9.11 بالماء H A R Sym :
 corrigendum بالهواء ؟ / 10.2 قطر : A ras. / الكبار : (=)
 (الصغار) ܡܡܥܬܐ Syc / 10.4 في انحداره - فيملس : invers.ord.
 Syc / 10.5 اما R / 11.2 السفلى H A R : correxi / 12.3 في
 الهواء H A R : correxi / 12,6 تجمع A / 13.5 الزابع A / 13.6
 تهب R : تحت (?) A : H ras. / 13.7 الاعلا H A R : correxi /
 13.8 ابخار H A R : correxi / 13.12 الى الجانب الاخر : من

ناحية الى ناحية اخرى 13.13/ Ba 13,9 = Be ch. 48 وجاء معه :
 وجامعه H A R : 13.17 / correxi لكيما : اليما R / <فيه> :
 כחכחכח cf. Syc 353b18 13.21 / بغتة : +
 כחכחכחכח .. כחכחכחכח Syc 353b22-24 13.25 / منها
 : فيها H A R : 13.30 / 13.30 / correxi; cf. Syc 353b29
 صعوبة صعوبة H : 13.36 / correxi والعالية : والغالبة H A R :
 13.40 / correxi وتجذب : وجالب H A R : 13.41 / ما
 اردناه H : 13.43 / partim rasum فرسطين (etiam al.loc.) H A R
 : 13.44 / A بحمود : بحمود A / ينتهي : ينقن
 H A (ut vid.) : 13.49 / A ينقض : R / السفن : - A / 13.49
 وبرجوعها A partim ras. 14.6 / A للمحاذي القمر A / 14.12
 وبددت : ومددت R / 14.24 على : - A / الاخبار R /
 14.27 ينقص : ينفعت H A R : 15.1 / correxi واختلافها A
 / ras. 15.5 / A ترطب : A partim ras. 15.8 / ضيقا : A ras.
 15.10 كثيرة : A ras. / 15.15 ينبغي : A ras. / 15.21 تكون :
 تكون A R / 15.24 تجويفا وفيها H A R : 15.28 /
 اسقطت A / 15.29 اذا : A ras. / 15.31 تكون : A ras. /
 15.32-33 تكون مائلة : A partim ras. / 1 / finis ثا فرسطس A /
 15.38 / A R - : 15.38 + في سنة ١٠٢٣
 الهجرية النبوية H .

"you discuss now with us the quality of حمدة دحج دح / lac.Syc / 1.2-3 / <...> the philosopher" Syc
 1.3 / lac.Syc غمامتان 1.3-4 / lac.Syc فقرعت ... أنا : lac.Syc 1.5
 الواحدة ... شديد : lac.Syc 1.6 / lac.Syc السبب الثاني : Syc 1.6
 ريح فدارت فيها : lac.Syc 1.8 / lac.Syc والخبابى ... صوت : lac.Syc
 1.9 في غمامة رطبة فطفئت : lac.Syc 1.10 / lac.Syc عندنا : + حح سمح
 ححح ححح <...> (e 351a10-11) / Syc ان الحداد اذا القى :
 lac.Syc 1.12 / lac.Syc غمامة عريضة جليدية lac.Syc 1.13 / lac.Syc الريح ...
 قرعت : lac.Syc 1.16 / lac.Syc ملتوية مجوفة : lac.Syc 1.17 / lac.Syc المصارين :
 lac.Syc / سمع : Syc 1.18 / lac.Syc احتقنت : lac.Syc 1.20
 مثانة : lac.Syc 1.24 / lac.Syc فمن ... الارعاد : - Syc 1.25 / lac.Syc اذ ليست :
 lac.Syc 1.38 / lac.Syc وهذا ... الشك : - Syc 2.1-2 / lac.Syc ذكر اسباب البرق
 : - Syc 2.11 / lac.Syc ان الحدادين : lac.Syc 2.11-12 / lac.Syc الحديد المحمى :
 lac.Syc 2.12-13 / lac.Syc والسبب الرابع اذا كان في : lac.Syc 2.13
 نار كامنة : lac.Syc 2.13-14 / lac.Syc او تفرقت وتقطعت : lac.Syc 2.15
 الماء : lac.Syc / اذا انضغطت واذا : lac.Syc 2.16 / lac.Syc فكذلك تكاثفت
 : lac.Syc 2.17-18 / lac.Syc خرج ... منها : lac.Syc 3.1 / lac.Syc ذكر اسباب ...
 برق : - Syc 3.2 / lac.Syc لثثة اسباب : - Syc additio transl. arab.?
 / lac.Syc 3.3 / lac.Syc في الغمام نار / lac.Syc واما لان فيها نارا الا : lac.Syc
 3.4-5 / lac.Syc كان ... الرعد : lac.Syc 4.1 / lac.Syc ذكر ... رعد : - Syc 4.2
 واما البرق : lac.Syc / قرع : lac.Syc 4.3 / lac.Syc يكون يسيرا : lac.Syc
 4.3-4 / lac.Syc فتزلق النار ... تتكاثف : - Syc 4.5 / lac.Syc برق ولا يتولد صوت :
 lac.Syc 4.6 / lac.Syc ما فيه من الماء : lac.Syc 5.1 / lac.Syc ذكر ... الرعد : -

/ lac.Syc : 5.2 لعلتين : lac.Syc / 5.3 لان : lac.Syc / معا : lac.Syc /
 5.4 اسرع مما : lac.Syc / 5.6 فانا نرى : lac.Syc / 5.7 الصوت
 الى : lac.Syc / 5.8 فهذا ... والابراق : - Syc / 6.1-2 ذكر ...
 اولاً : - Syc / 6.5-6 من افعال النار ... نارا : - Syc / 6.18
 والتهبت : - Syc / 6.19 بغتة ... نارا : lac.Syc / 6.20 في
 الرصاص ... بالقلع : lac.Syc / 6.21 تتولد : lac.Syc / 6.22
 صفار : lac.Syc / 6.23-24 وكما ... كثيرة : lac.Syc / 6.24-25
 الى موضع واحد : lac.Syc / 6.26 صاعقة واحدة : lac.Syc / 6.28
 من الغمام التي : lac.Syc / 6.30 والبرق : lac.Syc / خرجت منه
 الريح : lac.Syc / 6.31 والغمام : lac.Syc / اما من قبل شئ :
 lac.Syc / 6.32 او من قبل شئ : lac.Syc / 6.33-34 ونظير ذلك
 مما ... ان : lac.Syc / 6.35 انتفخت من داخل : lac.Syc / 6.40
 الهواء : lac.Syc / 6.50 وانفصل : lac.Syc / 6.56
 352a29, perhaps not literally translated into Arabic /
 والبخار : - Syc / 6.56-57 يتلبد ويجتمع ... وليس : lac.Syc /
 6.57-58 وتجمعه ... عليه : lac.Syc / 6.59-60 الحار له ... اجزاء :
 lac.Syc / 6.60 واكثر تلبد ... اكثر : lac.Syc / 6.61-62 واما ...
 لمكان : lac.Syc / 6.63 ومن ... اذا : lac.Syc / 6.64 انشقت :
 lac.Syc / 6.65 اسفلها ... المواضع : lac.Syc / 6.66-67 غير
 متساوية الاجزاء : lac.Syc / 6.67-68 فان طالبنا <مطالب> :
 lac.Syc / 6.69 انه يحتاج ... الى : lac.Syc / 6.70 ونار ... الشتاء
 : lac.Syc / 6.71 لمكان البرودة المفرطة : lac.Syc / 6.73 واما ...
 فلانه : lac.Syc / 6.74 فان طالبنا ايضا مطالب : lac.Syc / 6.75

- الصواعق : lac.Syc / 6.76-77 المواضع العالية فيها : lac.Syc /
 6.77 والصواعق من هذه تكون : ܐܡܪܝܢ ܡܢ ܡܕܝܢܬܐ ܡܢ ܡܕܝܢܬܐ
 Syc 352b17. The Arabic partially imitates the Syriac word
 / lac.Syc : 6.78 والثانية : lac.Syc / 6.79 من الغمام : lac.Syc /
 6.85 وان طالبنا () مطالب : - Syc / 6.86 اما السبب الذي له : -
 Syc / 6.87 واذا ابتها : - Syc / 6.89-90 من اجل ... الصاعقة : -
 Syc / 6.90-91 فهذا ... الصواعق : lac.Syc / 7.1 ذكر اسباب
 الغيوم : - Syc / 7.11-22 الغمام ... دخلت في : lac.Syc / 7.22-
 23 اثناء ... الغمام : lac.Syc / 7.24 وكما ... ان السهم ذاهب :
 lac.Syc / 7.25 كذلك ... يسقط : lac.Syc / 7.26 ان الغمام ...
 يستطيع : lac.Syc / 7.27 لموضع البخار والريح : lac.Syc / 7.27-
 28 والغمام يستحيل : lac.Syc / 7.28 اذا غلظ ... يكون : lac.Syc
 / 7.29 واما من البرودة : lac.Syc / 8.1 ذكر ... الامطار : - Syc /
 8.2 واما ... فتكون : lac.Syc / الغمامة وجمعتها : lac.Syc / 8.3-4
 واما الامطار ... والارض : lac.Syc / 9.1 ذكر اسباب الثلج : -
 Syc / 9.2 البرودة قبل ان يستحيل : lac.Syc / 9.3 الى الماء : + .
 ܐܡܪܝܢ ܡܢ ܡܕܝܢܬܐ ܡܢ ܡܕܝܢܬܐ (the cloud) had turned (to water) Syc 353a19
 / lac.Syc : 9.4 وقبل ان يتصل ... الماء : lac.Syc / 9.4
 منقسما ... يفرق : lac.Syc / لانا ... عيانا : ܐܡܪܝܢ ܡܢ ܡܕܝܢܬܐ
 Sym (inc. 182r b27) / Schl. cp.9,14 "furthermore, it is
 known that" / 9.5 ان في الثلج ... كثيرا : lac.Syc / 9.6 انعصر
 ... مقداره : lac.Syc / 9.7 خرج : lac.Syc / الكثير منه مقدار :
 lac.Syc : 9.8 / finis Sym 182v a3/Schl. cp.9,19 : lac.Syc
 inc. : والسبب :

lac.Syc : كثرة ما فيه من الهواء / Sym 182r b19/Schl. cp.9,10
 / lac.Syc : محتبس / lac.Syc : كثير : 9.10 / lac.Syc : 9.9 فيها /
 Sym (finis 182r b26/ - / lac.Syc : والمنى : 9.11 بالماء والمنى :
 Schl. cp.9,14) / lac.Syc : 10.1 ذكر اسباب البرد : 10.2 استحال
 lac.Syc : الكبار : ἡλικία (= الصغار) / Syc : وجمد : lac.Syc :
 10.3 حروفه تكسر : lac.Syc : 10.4 في انحداره - فيملس :
 inv.ord. Syc / في طبيعته : lac.Syc : 10.5-6 من جميع النواحي :
 lac.Syc : 11.1 ذكر اسباب الظل : - Syc : 11.2 اذا كان في
 الموضوع : lac.Syc : 11.3 كون الغمام : lac.Syc : 11.5 او :
 lac.Syc : بخارات : lac.Syc : 11.6 يغلف ... ليس - Syc : 11.6-
 7 من الهواء شئ كثير فيمنعه : - Syc (partim lac.) : 11.7 يمنع :
 lac.Syc : 11.8 من النزول والقطر الصغير : lac.Syc : 12.1-6 ذكر
 ... الدمق : lac.Syc : 13.1-6 / lac.Syc : 13.7 تتحرك = Syc
 353b9 / 13.7-8 اما ... عليه : lac.Syc : 13.8-10 الهواء ...
 الاوقات : lac.Syc : 13.10-11 والقبلي ... اجتمع : lac.Syc : 13.11
 يبقي : lac.Syc : 13.12-13 موضع ... الاخر : lac.Syc : 13.13
 وجاء ... الارض : lac.Syc : 13.14 ونظير ... اذا : lac.Syc :
 13.15 الماء ... فيه : lac.Syc : 13.16 الخلاء : lac.Syc : 13.16-17
 وملا الانبوب لكيما لا يبقى موضع : lac.Syc : 13.17 يبقى : +
 353b18 / lac.Syc : فعلى هذه الجهة : lac.Syc : 13.18
 فوق فانها تتولد اما اذا : lac.Syc : 13.18-19 الماء الفوقاني والغمام
 : lac.Syc : 13.19 تصاعدت من الارض : lac.Syc : 13.20 كثيرة :
 lac.Syc : 13.21 ورجعت الى اسفل بغتة : lac.Syc : 13.21 بغتة :
 + 353b ἡλικία ... ἡλικία ... ἡλικία ...

/ lac.Syc : بخارات كثيرة : lac.Syc : فتكون اذا 13.22 / 22-24
/ lac.Syc : البخار اللطيف الحار : lac.Syc : فتكون 13.23
: lac.Syc : الرياح : lac.Syc : المواضع : lac.Syc : تنحل 13.30
.finis Syc : تستطيع 13.31 / partim lac. Syc

English Translation

{In the name of God, the Merciful and Compassionate!
We ask Him for His help}.

THEOPHRASTUS' TREATISE ON METEOROLOGICAL PHENOMENA

[1.] *The account of the causes of thunder*

(2) We say: Thunder (pl.) arises as a result of seven causes:

The first cause: (3) When two hollow clouds collide and therefore the one strikes against the other. (4) We can observe something similar amongst us: When we make our hands hollow and strike (5) the one against the other, a great noise is the result.

(6) The second cause: When the wind enters a hollow cloud and then rotates in it. (7) We can observe something similar amongst us: When a wind blows and then enters (8) caves and large jars, a noise is the result.

(9) The third cause: When fire falls into a humid cloud and then is extinguished. (10) We can observe something similar amongst us: When an ironsmith throws glowing iron (11) into water, a great noise is the result.

(12) The fourth cause: When the wind violently strikes a broad and icy cloud. (13) Something similar we can observe amongst us: when the wind strikes against (14) paper, a great noise arises thereby.

(15) The fifth cause: When the wind enters a long, (16) crooked and hollow cloud. We can observe something similar amongst us: (17) When butchers blow up guts, a noise can be heard because the wind passes through them.

(18) The sixth cause: When much wind is congested in (19) a hollow cloud and when (the cloud) is split open. We can observe something similar amongst us: When (20) a bladder is filled with air and (then) is perforated, a violent and great noise is the result.

(21) The seventh cause: Whenever rough clouds rub against each (22) other.

We can observe something similar amongst us: When one millstone rubs (23) the other, a great noise is the result.

(24) Thunder arises because of the causes that we have mentioned. Now, suppose someone is sceptical (25) and asks: "How is it possible that noise arises from clouds since they are not (26) solid like stones and earthenware but rarefied like (27) wool, whereas noise cannot arise from wool? For noise does not arise if a man beats (28) tufts of wool, one with the other". We can answer: We (29) too do not maintain that noise arises in clouds because they are solid (30) and similar to stones. We say however: even if the clouds are (31) rarefied and split they are still able to make much noise. (32) Similarly we can see among things that are visible solid things that (33) produce no noise, like a pot of clay and lead. For these things (34) do not have any causes which result in the making of much noise. And (we can see) among (35) (visible) things rarefied things that produce much noise, like water and (36) dry leaves. —Because wool is rarefied it does not produce any noise, (37) not by virtue of being rarefied but because the causes which produce noise do not (38) exist in it. This is our answer to that sceptical question.

[2.] *The account of the causes of lightning*

(2) We say: Lightning happens because of four causes:
The first (3) and second cause are beating and friction. We can observe something similar (4) amongst us: If one stone beats another, then (5) fire comes out of them. If one (piece of) wood is rubbed against another, fire breaks out. (6) Similarly, we find people in the desert who strike fire by rubbing (7) one (piece of) wood against another. That (can) happen because they heat the air (8) which is between the (pieces of) wood and turn it into fire; or because they stir up (9) particles of fire in that (piece of) wood and let them out.

The (10) third cause: When fire is extinguished in a humid cloud, the thin (part) of (the cloud) is ignited. (11) We can observe something similar amongst us: When the ironsmith (pl) submerges (12) glowing iron in water, fire is caused by that.

The fourth cause: If there is (13) hidden fire in the cloud and (if) then the cloud is compressed and squeezed or (14) split and cut up. Similar to that are the sponge and tufts of wool (15) in which there is water; water comes out of them when they are compressed or split. (16) And likewise too fire comes out of the cloud when it is condensed and squeezed or when it is rarefied (17) and cut up.

These are the causes by which lightning can occur.

[3.] *The account of the causes of thunder occurring without lightning*

(2) Sometimes thunder without lightning occurs as a result of (one of) three causes: (3) because there is no fire hidden in the cloud; because there is in it only (4) a little fire which is not enough to produce lightning; or because there is much (fire), but (5) it cannot go out on account of the density of the cloud.

If that is (6) as (described), thunder occurs through the striking and friction of clouds, but lightning does not.

[4.] *The account of the causes of lightning occurring without thunder*

(2) Lightning without thunder occurs as a result of two causes: Because the striking (3) and friction of clouds are slight, so that the fire can slip away and goes out, whereas the noise remains hidden; (4) or because the cloud is rarefied and not dense, so that (5) the fire in it comes out and lightning is produced but no thunder. Similar to that is (6) the sponge: when it is split and squeezed, the water in it comes out, but there is no (7) resulting noise.

[5.] *The account of the reasons why lightning precedes thunder*

(2) Lightning precedes thunder for two reasons: Because the fire leaves the cloud (3) very quickly; or because lightning and thunder occur at the same time, but we see the lightning (4) more quickly than we can hear the thunder.

Similarly, when we see (5) a man from afar splitting firewood, (6) we can first see his blow but later we hear the noise, whereas we do know that there (must) be a noise simultaneous with the blow. This is because (7) the perception arrives at the eyes quicker than the noise reaches (8) the ears.

This is our report on thunder and lightning.

[6.] *The account of the causes of thunderbolts*

(2) About thunderbolts we say this: Firstly, (3) the thunderbolt is a windy fire or a fiery wind. For if it (4) falls on brushwood¹⁰⁸ or¹⁰⁹ wood, it burns that and sets it on fire; but if it falls on gold (5) or silver, it pours this forth and melts it. These effects belong to those of the fire.

(6) Moreover, we say after that: Even if the thunderbolt is fire, it is not like that (7) of the live coal, but flaming fire. For if it falls on the earth, (8) it cannot be found as smoldering embers. However, that place on which the thunderbolt has fallen appears (9) to be full of much smoke and torn. These (peculiarities) belong to the qualities of fire and wind.

¹⁰⁸ Only in the Syriac original.

¹⁰⁹ Only in the Syriac original.

(10) Moreover, the thunderbolt is finer than all the flaming fires which exist (11) amongst us. For the fires which exist amongst us do not pass through walls (12) and earth; however the thunderbolt passes through every perceivable substance without (13) being visible, because by virtue of its fineness it escapes our eyesight. Therefore nobody (14) can see the thunderbolt (itself), but (only) its effects can be looked at. It cannot be seen (15) because of its fineness. And because of its quick movement, its quickness outstrips the time (16) in which vision can occur.

The thunderbolt results from two causes: when (17) fire is hidden in the cloud and suddenly slips away; when (18) wind is hidden in the cloud and catches fire because it circulates, is rubbed against the cloud, (19) goes out suddenly and comes to us in a violent manner. (In this way) it becomes fire, as we can see (20) in bullets when they are thrown by a catapult. They become hot by rubbing against the air, (21) catch fire and melt away.

The thunderbolt is produced either in a huge cloud (22) or in many small clouds: If they come together with each other, (23) one single thunderbolt occurs. In the same way that (24) one single river is formed from many fountainheads, when the water coming from them is assembled in (25) one place, so too from many clouds, even if they are not big, (26) one single thunderbolt arises when the fire coming from each one of (27) the clouds, is assembled, brought together and becomes one single (fire). In this way (28) the thunderbolt is brought forth.

The thunderbolt emerges from the cloud, in which the fire (29) is hidden, when the cloud is cut through—as from a bladder (30) or a skin the air restrained in them begins to emerge when they are trodden underfoot and burst. (31) The clouds are cut through either by something that squeezes <them from outside (32) like coldness or a splitting wind or by something that cuts> or (33) expands them from inside—like fire and wind. (34) We can observe something similar amongst us: A bladder bursts when it is squeezed from outside, (35) is strongly inflated from inside or becomes full of cracks (36) and is cut up.

When the thunderbolt reaches us, it happens as a result of two causes: (37) because the bottom of the cloud is split or because some storms or winds (38) have beaten it on top. We can observe something similar amongst us: When an arrow (39) hits a shield, it returns with great violence. And in addition: when a blown up skin is split (40) from the bottom, the air which is restrained in it emerges suddenly and (goes) (41) downwards because of that splitting.

The reason that the cloud is split from the bottom and not from (42) the top is as follows: Those two vapors which ascend from the earth are joined, (43) namely the thick vapor and the fine vapor. If they ascend, (44) then the fine one of both (kinds) moves quickly upwards, because it approaches its natural place. (45) And that is because each one of the bodies, when it is distant (46) from its (natural) place, has a weak and a slow movement; but if it is near to its (natural) place, (47) (its movement) is quick and strong. Therefore, whenever the fine vapor (48) ascends, it has a quick movement. And because the thick vapor cannot (49)

accelerate its ascension like (the fine vapor), they both become separated and consequently (50) the fine (vapor) precedes the thick. When both are separated from each other and the fine vapor is removed from (51) the thick, (the fine vapor) produces an altogether quick movement upwards. Because the thick vapor (52) is no longer assisted by the fine vapor which accompanied it during its ascension, (53) it takes another way and sinks downward. (54) But because an abundance of air beneath it as well as the wind and the vapor ascending from (55) the earth prevent it from descending (to the bottom)—inasmuch as in itself it should move (56) downwards, but the wind, the vapor and an abundance of air prevent it (from doing so)—it is compressed, (57) compacted, and thus becomes a cloud.

It is not this movement alone which compresses and compacts (the cloud), (58) but it is also effected by that excessive cold around it, because (59) the fine and hot vapor has left it. Therefore the upper parts (60) of the cloud are more condensed and compressed. And that is because they scarcely (61) have this <hot> vapor. However the lower parts dissolve (62) somewhat and follow into the place of the other hot vapors which ascend (63) and then mix with them. When the clouds are extended by the wind which is produced (64) in their interior, the result is that they are split not from above in (65) the dense places, but from below in the rarefied places. (66) We can observe something similar amongst us: When a bladder which is not regular (67) in its parts is filled with air, those parts of it are split which are weaker.

When (68) <someone> demands that we give the reason why thunderbolts are more frequent (69) in the spring, we can answer: For the thunderbolts to arise, clouds, (70) wind and fire are required; during winter clouds and winds exist, (71) not however much fire because of excessive coldness; but during (72) summer there is much fire, whereas no clouds can be found. (73) However, because spring is a moderate and temperate time, one can find in it (74) enough fire, clouds and winds.

When, moreover, someone demands that we give the reason (75) why thunderbolts are more frequent in high places, (76) we can answer: That happens for two causes: firstly, because in high places (77) there are many winds and clouds; the thunderbolts come from them. (78) Secondly, because high places are close to the clouds, but low places (79) are remote from them. Therefore thunderbolts reach (80) the high places before they are dissipated; they do not reach the low places, (81) because they dissolve before that. It is similar to the following: when we throw a piece of clay¹¹⁰ (82) from an elevated place, the piece descends safely if the height is small; (83) but it is dispersed if (the height) is great. In the same manner thunderbolts reach (84) the high places, because they are close to the clouds; they do not reach the (85) low places, because they are dissolved before that. When,

¹¹⁰ The Syriac text is incomplete. The Arabic word *madara* appears to be a wrong rendering of the Syriac word *medra*: cf. above, section V.

moreover, someone demands (86) that we give the reason why the thunderbolt, when it falls upon a purse with dinars, (87) does not affect the purse but affects and melts the dinars, we can give (this) answer: (88) The purse is porous, so that it gives the thunderbolt a way to penetrate. But because (89) the dinars are dense and do not give (the thunderbolt) a passage, the result is that (90) the violent thunderbolt comes to a standstill at them. For this reason it has no influence upon (91) the purse, but affects and melts the dinars.

This was what we wanted (92) to say about the thunderbolts.

[7.] *The account of the causes of clouds*

(2) The clouds come into existence for two causes: because of the accumulation (3) and thickness of air and its transformation into the nature of water¹¹¹ or because of much vapor (4) which ascends and with which the ascending vapors of the seas as well as the remaining (5) fluids become mixed.

Air comes together and becomes thick for two reasons: (6) because of coldness or because of contrary winds which squeeze it and bring it together. (7) We can observe something similar amongst us: When ascending vapor in (8) the bath encounters the roof and cannot penetrate this because of its thickness, (9) it accumulates and becomes water.

The clouds float above (10) the air, although they are heavier than air, for three reasons:

Firstly, because (11) the quantity of air beneath the clouds is great and therefore the heavy clouds cannot (12) impose force on it. We can observe something similar amongst us: When (13) a man dips his hand in water or oil, then (14) afterwards in sand and suspends it, the lower side turned up, no water or sand descends to (15) the earth. The only reason is (16) that they both because of their smallness and because they are heavy cannot rise above the air or descend. (17) When therefore their quantity is a little greater they descend. So (18) too in the same way dust sometimes remains hanging in the air for a long time and does not descend (19) for precisely this reason. Furthermore, wood floats on water, if (20) there is much (water); but if there is little water, (the wood) touches the bottom. We do not (21) say that this happens on account of the air which penetrates the wood. For if (22) you put a filled vessel into water and submerge it up to its top, (23) you will find exactly the same thing happening.

The second reason is, because the clouds (24) are (constantly) going and moving; and just as an arrow goes sideways without falling on (25) the earth, so too clouds do not fall on the earth, if they move sideways.

(26) The third reason: Clouds cannot descend (27) because of the vapor and the wind which ascend from the earth.

¹¹¹ The Syriac (Syc 352b29) has *k-yānā mayyānā* "watery substance" which has been mistranslated: cf. above, section V.

The clouds (28) turn into water, when they become very thick; their thickness is (29) caused by the pressure of hard winds or by coldness.

[8.] *The account of the causes of different kinds of rain*

- (2) Heavy rain occurs, if very hard winds squeeze and accumulate the clouds.
(3) Continuous rain occurs, if many vapors ascend (4) from the seas.

[9.] *The account of the causes of snow*

(2) Snow comes into existence, when coldness freezes the clouds before they turn (3) into water and—<after they have changed>¹¹²—before one part of the water is connected with the other, as long as (the water) is scattered (4) and dispersed in the form of very small drops which are separated by the air. For we can (5) see with our own eyes that in snow much air is contained. A proof of (6) this is its softness; when it is pressed by the hand, it becomes little in quantity and when (7) it melts and becomes water, from its large quantity (8) (only) a small quantity of water comes out.

The reason for the whiteness of snow is the abundance of (9) air in it. A proof for this is the fact that we find all those bodies white in which (10) much air is contained, as for example foam, oil—which is beaten (11) with water—and semen.

[10.] *The account of the causes of hail*

(2) Hail comes into existence when big¹¹³ drops of water are transformed and hardened (3) by coldness. The hailstone is round because its edges are broken off (4) during its descent and therefore it is smooth; or because it consists of an element which by nature has (5) a round shape, i.e. water; or because the coldness has hardened and compacted it from (6) all sides in an equal manner.

[11.] *The account of the causes of dew*

(2) Dew comes about when there exists in the lower portion of the air (3) that which exists in the upper portion, when clouds (4) and rain occur. Namely, if the air becomes thick in the lower portions (5) and compacts or if vapors ascend and become thick in (the air) on account of coldness, then (6) the thick part descends as a result of its heaviness, since there is not (7) much air beneath it which could prevent it from descending, as the air above prevents (8) the large quantity of clouds from going down and from letting small drops fall.

¹¹² Only in the Syriac text.

¹¹³ The Syriac wrongly has "small".

[12.] *The account of the causes of hoar-frost* ¹¹⁴

(2) Hoar-frost arises when the dew freezes on account of coldness. The reason for the whiteness (3) of hoar-frost is the air which becomes mixed with it; for what is snow above (43) exists below as hoar-frost and what is rain above exists below as dew. (5) Therefore we may say that hoar-frost arises because of the freezing of (6) watery vapor before it compacts and becomes water.

[13.] *The account of the causes of different winds*

(2) Wind is formed from vapor which is composed of fine and thick (parts); (3) the fine dominates over (the thick). Winds arise from above and (4) from below; their generation from below is either from water or from (5) earth. Namely, we may sometimes find that whirlwinds fall from the clouds, from above, (6) and that winds blow from below, from the water (pl.) and from the mountains.

The wind (7) moves because of its lightness when it tries to reach an upper place, for it is—as (8) we have said—compound vapor in which the fine is dominating. And (it moves) because the air (9) compacts and is compressed, sometimes in the east and (10) sometimes in the west, south or north: Whenever (11) the air compacts at that place and is compressed so that there is no (12) empty place left, the air moves from <one side to> (13) the other since it is forced by the vacuum and carries with itself vapor from the water and the earth, (14) so that there is no longer a vacuum. We can observe something similar amongst us: When (15) we place a tube on the surface of water and extract the air in it (16) by sucking it with the mouth and by using the force of the vacuum, the water ascends and fills the tube, (17) so that in it no vacuum is left. In this manner the winds are generated (18) from below. They originate from above, when the upper water (19) and the clouds are dissolved and become wind, or when many vapors rise from the earth, (20) then beat clouds or the air which is circulating and located above (21) and suddenly return downwards. <The movement which is sideways and crooked (can be found in winds which) result from two (kinds of) vapors: the one is heavy (and descends, the other is light and) rises up. The heavy (vapor) is moved (towards the light one and thus)>¹¹⁵ the winds move in a crooked movement.

(22) Strong winds occur, when many vapors ascend. (23) Continuous and permanent winds exist, when vapors ascend permanently. (24) Hot and cold winds result from two causes: because of (25) the places from which they come or because

¹¹⁴ *Damaq* from Persian *damak*; its meteorological meanings are: 1) “wind and snow” (taken over by the Arabic lexicographers) and 2) “icicle.” Bar Bahlūl (Arabic t. 12,1) has *az-zamharīr wa-l-ḡalīd* “Reif und Eis” (Be). The Syriac is incomplete here.

¹¹⁵ Cf. Syc 353 b 22-24 (fragmentary), Olymp., *Meteor.* 175,7 and Dr.L. p. 444, n. 32.

sometimes there is much (26) fine and hot vapor and sometimes (27) (much) cold and thick vapor. Moreover, the winds which arise from high places (28) dry out the air, because by violently coming they push away from it the vapor and the thick (29) and firm clouds. But the winds which descend from low places (30) moisten the air, because their great violence is being dissolved before they reach us. (31) Therefore they cannot push away anything from the air. For (32) that reason the northern winds are dry and the southern winds are humid.

(33) If someone demands that we give the reason why the wind which is called (34) 'WRS pushes forward the ships in a violent manner and pulls the clouds (backwards), (35) we answer: Either there are two winds which are contrary in their movement and blow at the same time: (36) the lower one of them which is directed towards the earth pushes away the ships (in one direction), but the upper one of them (37) pushes the clouds away in the opposite. {(However) we believe that the clouds (38) are drawn by the wind which pushes away the ships}. Or (we can answer): There is (only) one wind; (39) however, it causes circulations and rotations; therefore it pushes away the ships, (40) when it circulates. (At the same time) it pulls the clouds to the opposite side and forces them (41) into a movement which is contrary to that of the ships. —This was what we wanted to say (42) about that.

(43) We (may now) give a report about the *Prester* and say: It is similar to an airy pillar (44) which is stretched out from the heaven to the sea and draws the ships (45) upwards. When it goes down to the earth, it is called a "hurricane". It occurs either when (46) a hollow cloud sets itself up forcing the wind and stretches to the sea, the wind is pulled because of (the cloud); (47) or (it occurs) through a wind which rushes off violently. This hurricane (48) draws the water and the ships upwards, because when the wind collides (against the water), (49) it bounces back with force and by doing so it raises the air. Thus, when the air ascends, (50) the water and the ships go up with it so that no vacuum is left. This (51) hurricane drives back without destroying the ships which it causes to ascend, when the wind does not cease suddenly, but gradually becomes weak. The ships are destroyed (however) by (the wind), (53) whenever it suddenly ceases for whatever reason and when (54) the ships because of the (failing) wind suddenly and violently fall down.

[14.] *The account of the causes of the halo round the moon*

(2) The halo round the moon occurs when the air becomes thick and is filled with vapor, (3) ¹¹⁶so that a wavelike movement arises in it on account

¹¹⁶ The passage paragr. 14.3-11 ("... forms a ring") is paraphrased in Ibn al-Khammār, *Maqālā fī l-āthār al-mutakhayyila fī l-djauw*, ms. Andhra Pradesh Government Oriental Manuscripts Library and Research Institute (Hyderabad/India) Falsafa 63, fol. 43r10-14 (cf. fol. 44 r ult. - 44v1).

of the moonlight. In a similar way, if (4) we throw a stone into water, a circular movement occurs round the stone. (5) Because the rays of the moon encounter air, as long as this (air) is thick, the place (6) opposite the moon is thin. And the thinner this part of the air, (7) the more those parts are thick, which are around it. Therefore the thick air (8) around this part which is already fine becomes a ring. Comparable with that is the following: (9) When a man blows through a tube on a place with dust, he cleans the place (10) on which he blows; (at the same time) the dust which is swept away from it is collected on the place (11) surrounding the clean place and forms a ring¹¹⁶. The ring round the moon (12) dissolves, when a strong wind blows and disperses the thick (air) and when it is (13) raining. Each of these things happens for the (above-mentioned) reasons.

(14) Neither the thunderbolt (pl.) nor anything that has been mentioned has its origin in God. For it is (15) not correct (to say) that God should be the cause of disorder in the world; nay, (He is) the cause (16) of its arrangement and order. And that is why we ascribe its arrangement and order to God (17) {mighty and exalted is He!} and the disorder of the world to the nature of the world. And moreover: (18) if thunderbolts originate in God, why do they mostly occur (19) during spring or in high places, but not (20) during winter or summer or in low places? In addition: (21) why do thunderbolts fall on uninhabited mountains, on (22) seas, on trees and on irrational living beings? God (23) is not angry with those! Further, more astonishing would be the fact that thunderbolts (24) can strike the best people and those who fear God, (25) but not those who act unjustly and propagate evil. It is thus not right to (26) say <about> hurricanes that they come from God; (we may) only (say the following) about something that happens to us (27) to our harm or that diminishes divine power: It happens (28) without any order. Consequently there is no indication of passing away in the case of God and any (29) indication of being like an angel (=godlike)¹¹⁷ is to be removed from us.

[15.] *The account of the causes and of different kinds of earthquakes*

(2) There are four causes of earthquakes:

(a) If there is (3) in the earth a hollow like a cave and like a cavern, and if the upper (side) of it falls (4) inward. For it falls down because the earth becomes dry and crumbles, or because (5) it becomes humid and dissolves. Similar to that we can find (the following): If a single stone falls down from (6) a stone column and leaves its place, (7) the whole column begins to stagger.

(b) If some hollows contain water (8) which is shut up, and if that water is moved, because it finds a narrow exit or because of (9) another reason, it shakes the earth as billows cause a ship to shake.

(c) If (10) the earth contains much wind which is shut up, and if then this wind

¹¹⁷ On the substitution "angel" for "god" s. above, section V.

can pass out (11) through a narrow way, it shakes the earth. For that reason noises sometimes occur together (12) with earthquakes.

(d) If the earth contains much fire (13) which is shut up and (if then the fire) makes the air contained by that earth fine, (14) dissolves it and makes it loose, (the fire) begins to look for a larger place. If therefore (the air) (15) splits up and leaves the earth, it begins to shake that. —It is appropriate (16) to believe that earthquakes happen because of these reasons.

The reason why (17) earthquakes are more frequent during the absence of winds may be described by us as follows: During (18) the absence of wind, the wind is restrained inside the earth and cannot pass out (19) through its hollows, so that therefore earthquakes occur.

If much wind is blowing, (20) there are no earthquakes because at that time the wind is not restrained in the hollows (21) of the earth, but can pass out.

(22) If someone demands that we give the reason why on (23) some places of the earth no earthquakes occur, we answer: There is no hollow in these places; (24) or there is a hollow, but the earth above it is stony; or there is no (25) wind in them.

(26) If someone demands that we give the reason why some earthquakes are (27) a kind of trembling, some a kind of inclination with an inclining movement and some only a kind of inclination (without an inclining movement), (28) we answer: Earthquakes of the trembling kind occur, if hollows (29) inside the earth cave in. Comparable with that is the following: if (30) one single stone falls down from a stony column, the other stones move in a trembling movement. — (31) Earthquakes with inclination and with inclining movement happen, when (32) a wind comes forth and violently beats a place on the earth. —Earthquakes are (33) only a kind of inclination (without an inclining movement) if the wind beats and does not return, because it gets in touch (34) with air or because its power becomes weak before it can reach another place (35) on the earth.

(36) Theophrastus' treatise on meteorological phenomena is finished.

{(37) Praise be to God for His guidance and instruction! May He bless our master Mohammed (38) and his family who are excellent and pure.}

Commentary

Title. **Th:** *Vent.* 1.376,37-38 W. —**I:** referred to as Μεταρσιολογικά see D.L. 5.44 (= ed. M.G. Sollenberger, *RUSCH* II, 1985, p. 24, line 145) Μετάρσια (Plu. *Quaest. graecae* 7 = *Moralia* 292 C), Μετέωρα see D.L. 5.47 (= ed. Sollenberger, *RUSCH* II p. 32, line 221); *Olymp. in Mete.* 97,6-7; cf. the summary of the contents (incomplete and somewhat disturbed) in Proclus *in Ti.* 176e (II 121.3 Diehl); on the Arabic tradition see introd. —**L:** O. Regenbogen, *RE Suppl.* VII,1940, col. 1408 f.

1. Against St. not only nr. 5-7 are causes of thunder accepted by Th himself; therefore, nr. 1-4 are not doxographical reports, but Th's own doctrine, based on earlier theories. —Contrary to Aristotle, *Mete.* II, III Th describes winds no more together with thunder, lightning and thunderbolt but in a separate chapter (13). **I:** Seneca, *QN* II (lightning, thunder) and V 12-13 (whirlwinds in the ch. *De ventis*). —Contrary to Aristotle who regarded all these phenomena generally as results of the dry ἀναθυμίασις Th gives by having recourse to earlier theories (see below) seven causes of thunder, four causes of lightning and two causes of thunderbolt; Th uses the phenomena "beating", "friction", "splitting", "extinction" and movement of air or winds (in hollow or crooked clouds) and gives as in Aristotle's *Meteorology* (I 2) the elements air, fire and water a dominant role; cf. below ch. VII. —**L:** Strohm, *Zur Meteorologie* 411ff.; Dr.L. 437ff.; St. 184-188; W.St. 34f.

1.2-5. **S:** Heraclitus see Aetius III 3.9; on the collision of clouds cf. also Aristophanes, *Nu.* 375f. and 404ff. —**I:** Stoics, Zenon, Chrysippus see Aetius III 3.12.13; D.L. 7.153; Lucretius VI 96-101 (cf. here and in other cases Reitzenstein p. 24ff.); Seneca *QN.* II 27.4; 28.1; Plin. *HN.* II 113.

1.6-8. **S:** Heraclitus see Aetius III 3.9; Arist. *Mete.* II 9.369a35-b1. —**I:** Epicur. *Ep. ad Pyth.* § 100; Arist. *Probl.* XXV 2.938a9ff.; Arist. *Mu.* 395a12-13; Lucretius VI 121-131.194ff.; Seneca *QN.* II 27.1; 29.1.

1.9-11. **S:** Empedocles see Aetius III 3.7; Anaxagoras see Aetius III 3.4; Leucippus see Aetius III 3.10; Archelaus see Aetius III 3.5; discussed by Aristotle, *Mete.* II 9.369b15ff.; 370a5ff.; *APr.* 94a2. —The example of heated iron in water: cf. Homer, *Od.* IX 391. —**Th:** cf. *Mete.* 2.9-12. —**I:** Lucretius VI 145-149; Seneca, *QN.* II 17; Plin. *HN.* II 112.

1.12-14. **S:** Metrodorus see Aetius III 3.3; Arist. *Mete.* II 9.369a28-29.35-b1. —**I:** Epicur. *Ep. ad Pyth.* § 100; Lucretius VI 108ff.; 156-159.

1.15-17. **S:** Metrodorus see Aetius III 3.3; Heraclitus see Aetius III 3.9; Arist. *Mete.* II 9.369a35-b1. —**I:** Lucretius VI 132-136; Plin. *HN.* II 113.

1.18-20. **S:** Metrodorus see Aetius III 3.3; Anaximandrus see Aetius III 3.1; Arist. *Mete.* II 9.369a35-b1; on the splitting of clouds cf. also Aristophanes *Nub.* 375f.;

404ff. —Th: cf. *Mete.* 6.28-41; 63-67 and 6.9 on the tearing quality of fire and wind. —I: Epicur. *Ep. ad Pyth.* § 100; Arist. *Mu.* 395a12-13; Stoics see Aetius III 3.12; among them Chrysippus see Aetius III 3.13 and Zenon see D.L. 7.153; Lucretius VI 137-138; Seneca *Q.N.* II 15; 27,3; 28,2; Arrian see Stobaeus I 235,17 Wachsmuth.

1.21-23. S: Democritus see Aetius III 3.11. —I: Epicur. *Ep. ad Pyth.* § 100; Stoics see Aetius III 3.12; Lucretius VI 116-120.

1.24-38. I: Seneca *Q.N.* II 28; cf. Dr.L. 447ff., St. 187-189; W.St. 36.f.

1.27ff. S: cf. Arist. *Mete.* IV 9.386b16 on wool (ἐρίον). —Th: on the example of wool cf. also *Met.* 2.14-15.

2. The chapter on lightning shares with the thunder the same principles: cf. on the 1st and 2nd cause in the preceding chapter thunder nr. 1 and 7 and on the 3rd and 4th cause thunder nr. 3 and 6. —L: Strohm, *Zur Meteorologie* 411ff.; St. 174f.; W.St. 37f.

2.2-9. Th: *De igne* 1.350,34-36 Wimmer; this text is shorter because it presupposes the existence of the *Meteorology*. The Greek text of *De Igne* has πλῆγή for “beating” and θλίψις (“pressure”) / πίλησις (“compression”) for “friction” in the Arabic. Therefore, it seems that θλίψις should be replaced by τριψις “friction” as suggested by Steinmetz (see St. 113; W.St. 37f.) and taken over by Konrad Gaiser, *Theophrast in Assos*, Heidelberg 1985, p. 37 (commented German translation of *De igne* 1-10a and 44); cf. however Antonio M. Battegazzore, ‘Aristotelismo e anti-aristotelismo del De igne teofrasteo’ (in: *Elenchos* 5, Napoli 1984, p. 45-102) p. 56ff.

2.2-5. I: Epicur. *Ep. ad Pyth.* § 101-103; Arist. *Mu.* 395b5; Stoics see Aetius III 3.12, among them Chrysippus see Aetius III 3.13 and Zeno see D.L. 7.153; Lucretius II 22.2; VI 160-163; Seneca *Q.N.* II 22.1-23.2 (cf. St. 182f.); Plin. *H.N.* II 113; Arrian see Stobaeus I 235.19-20 Wachsmuth.

2.5;7-8. S: Arist. *De caelo* II 7.289a20-29. —Th: *De igne* IX 64 361,43ff. Wimmer; cf. *Mete.* 6.18.

2.7-9. Th: *De igne* I 350,37f. Wimmer (shorter).

2.8-9. Th: cf. *Mete.* 2.12-13 and 6.16-17.

2.9-12. Th: cf. *Mete.* 1.9-11.

2.12-13. Th: cf. *Mete.* 2.8-9. —I: Arist. *Mu.* 395a15-17; Epicur. *Ep. ad Pyth.* § 101-103; Lucretius VI 204-218.

2.14. Th: cf. the tearing quality of fire and wind in *Mete.* 1.18-19 and 6.9.

2.14-15. S: cf. Arist. *Mete.* IV 9.386b5ff. and 16ff. on wool and sponge; a rather unspecific use of sponge can be found in Arist. *Mete.* I 13.350a7. —Th: on the example of wool cf. *Mete.* 1.27ff. and on the sponge *Mete.* 4.6.

3. Th: Lightning depends on the intensity of fire (cf. preceding chapter) and on the density of clouds (cf. ch. 7). —L: St. 186f.; W.St. 39f.

4. The discussion on lightning without thunder is based on the explanations given in ch. 2 and 3. —I: Lucretius VI 214-218; Pliny II 145. —L: St. 186f.; W.St. 40.

5. S: In *Mete.* II 9.369b7-11 Aristotle had given the wrong explanation that lightning is later than thunder but can be seen earlier, because sight is quicker than hearing. Theophrastus has abandoned this (lightning is either earlier than thunder or simultaneous) and gave another example, but kept to Aristotle's doctrine that sight is quicker than hearing. —I: Epicur. *Ep. ad Pyth.* 102-103; Stoics, Chrysippus see Aetius III 3.13; Lucretius VI 164-172; Plin. *H.N.* II 142. —L: St. 183f.; 189; W.St. 40f.

6. L: St. 175-190; W.St. 41-50.

6.3. S: cf. Arist. *Mete.* II 9.369b3-4. —I: Arist. *Mu.* 4.395a16; Lucretius VI 219-224; Seneca *Q.N.* II 12.6 (*spiritus ignis*); Arrian see Stobaeus I 235.9-236.7 ("fiery wind" = ἔμπυρον πνεῦμα) Wachsmuth.

6.4-5. Th: "gold or silver" appears replaced by "dinars" in 6.86ff.

6.6-9. Th: cf. the distinction between ἀνθραξ and φλόξ *De igne* 3; on the tearing quality of fire and wind cf. *Mete.* 1.18-19 and 2.13-14. —I: Lucretius VI 219-230; Seneca *Q.N.* II 21. —L: W.St. 42f.

6.10-12. S: on the fineness of thunderbolts which pass through an object before they burn it see Arist. *Mete.* III 1.371a20ff. —I: Lucretius VI 225ff.; 348ff.; Seneca *Q.N.* II 40.1; Plut. *Quaest. conviv.* IV 2,4 (665 F).

6.12-16. Contrary to lightning which can be seen before the hearing of thunder (s. ch. 5) thunderbolt is quicker than sight. Not in Aristotle. —I: Seneca *Q.N.* II 21.2; Arrian see Stobaeus I 235.25-236.7 Wachsmuth.

6.16-19. Th: *De igne* 1.350,37-39 Wimmer; *Mete.* 2.8-9.12-14. —I: Epicur. *Ep. ad Pyth.* § 103; Arist. *Mu.* 4.395a23-24; Lucretius VI 300-308; 271ff.; Seneca *Q.N.* II 57.2; Arrian see Stobaeus I 235.19-20 Wachsmuth. —L: St. 177; W.St. 43f.

6.19-21. S: Arist. *De caelo* II 7.289a20-29. —Th: On fire through friction see *Mete.* 2.4-9 (with other examples). —I: Lucretius VI 300ff.; Seneca *Q.N.* II 16; 57.2.

6.21-28. S: on the principle of accumulation of many clouds producing one single thunderbolt and on the picture of the river formed from many fountainheads cf. Arist. *Mete.* II 4.361b1-5.

6.28-36. Th: *Mete.* 1.18-20; 6.63-67.

6.36-37.39-41. Th: *Mete.* 1.18-20; 6.9 (principle of splitting). —I: Lucretius VI 295-299; Seneca *Q.N.* II 22-24.

6.38-39. S: cf. Arist. *Mete.* II 9.368a22-24 (with a different example).

6.41-57. S: Theophrastus starts as Arist. *Mete.* 369a16ff. from the supposition that the upper limit of clouds is denser and therefore prevents thunderbolts from following their natural tendency upwards. As Aristotle *Mete.* II 4., e.g. 360a10ff., he distinguishes between thick and fine of vapors which in Aristotle are called respectively ἀτμίς and ἀναθυμίασις which is θερμή (*Mete.* 371a5), ξηρά (*Mete.* 360b16) and

καπνώδης (*Mete.* 360a10). However, Theophrastus stresses much more than Aristotle the natural tendency of the fine ascending vapor and the thick descending kind and therefore did not take over Aristotle's principle of the reaction of warm and cold upon each other (ἀντιπερίστας Arist. *Mete.* 348b2); both kinds of exhalations are, differently from Aristotle (*Mete.* 358a21ff.), no more mixed; as they are separated from each other they have their own movement either downwards (thick vapor) or upwards (thin vapor). In this natural tendency they are hampered by vapors which have a different quality and therefore a contrary movement; vapors are thus condensed and become clouds. L: On Aristotle's ἀναθυμίασις cf. O. Gilbert, *Die meteorologischen Theorien des griechischen Altertums*, Leipzig 1907 (Hildesheim 1967), p. 460ff. and on the natural place in Theophrastus (6.44.46) Richard Sorabji, 'Theophrastus on Place,' in: RUSCH III, 1988, p. 139-66, esp. 150ff.

6.50-57. Th: on the function of rising fine vapors which prevent thick vapor from falling down and compress it to a cloud cf. *De ventis* 22 and *Mete.* 7.2-9 and 7.26-27

6.58-60. S: cf. comment on 6.51-57.

6.63-67. Th: *Mete.* 1.18-20; 6.28-36.

6.67-74. I: Lucretius VI 357-378; Arrian see Stobaeus I 238.4-9 Wachsmuth. — L: St. 180; W.St. 47f.

6.74-85. I: Epicur. *Ep. ad Pyth.* § 103. — L: St. 180f.; W.St. 49.

6.79-85. I: in the use of the example of falling earth H.B. Gottschalk (*Gnomon* 37, 1965, p. 761, note on Syriac text ed. W.St. 352b21) finds an analogy to Strato fr.73: "water falling from a height falls as a continuous stream for some distance, but then breaks up into drops".

6.85-91. S: cf. Arist. *Mete.* 371a24-29 (with other examples). — Th: in *Mete.* 6.4f. "dinars" (6.87) is replaced by "gold or silver". — I: Lucretius VI 348-356 (cf. 225-228); Seneca *Q.N.* II 31.1; cf. II 52,1; Plin. *N.H.* II 137; Arrian see Stobaeus I 237,18ff. — L: St. 181; W.St. 50.

7. Main subject of the discussion is the origin of clouds from humid, thick vapor (cf. also ch. 13); therefore the origin of rain (cf. ch. 8) is only incidentally mentioned at the beginning (7.3) and the role of the mountains for the "compression" (πίλησις) of air to clouds not at all; both themes are echoed—perhaps following Theophrastus' lost *Περὶ ὕδατων* (cf. below ch. VII) and partially more extensive—in Aristotle, *Probl.* 26.8 940b33ff., Lucretius VI 495-512, Vitruvius VIII 2-3 and Proclus, *In Plat. Tim.* 22 E (I 121.1). S: Th emphasized the role of "compression" (πίλησις) of thick air (cf. also 2.2-9) for the rise of clouds much more than Aristotle (*Mete.* 346b32-33) and added it to Aristotle's ψύξις "cooling" (cf. Arist. *Mete.* 347b18f. with 7.6 and 11.5) as a cause of rains. The result is a differentiating report on the origin of clouds which as a whole has no parallel in Aristotle who only incidentally gives some information on this topic. On Th's sources for his πίλησις

theory see below comment on 7.6. —Th: cf. *De ventis* 5. —L: St. 219f.; W.St. 50-52 and the literature given below.

7.2-9. S: On clouds as accumulation of air cf. Xenophanes see Aetius III 4.4 (uses the term πίλησις); Hippocrates *Aer.* II 34 Littré (= C.M.G. I 1.62,32ff.) and Galen's commentary which is lost in its Greek original but of which translations in Arabic (ms. Cairo, Taʿfat ṭibb 550) and Hebrew exist. According to the Hebrew translation Galen writes: "Nicodemus (the Arabic ms. fol. 55v6 has correct "Theophrastus" as G. Strohmaier, who is preparing an edition, has informed me) and his followers said that rains result from pressure and squeezing. And Hippocrates agreed with this when he said that the clouds come into being between two opposing contrary winds that press and squeeze them, and thus rains arise"; see text in Abraham Wasserstein, *Galen's Commentary on the Hippocratic Treatise Airs, Waters, Places in the Hebrew Translation of Solomon ha-Me'ati*, Jerusalem 1982 (= The Israel Academy of Sciences and Humanities. Proceedings VI/3), line 440-443 = Engl. transl. p. p. 63, G.46. —Th: cf. *De ventis* 5, *Mete.* 6.56-57 and 7.27-29. —I: Epicur. *Ep. ad Pyth.* § 99; Arist. *Mu.* 394a27f.; Plutarch, *De prim. frig.* 951 B; Proclus in *Ti.* 7D (I 120,25); Philoponus *In GC* 93,14; cf. also comment on 8. —L: Dr.L. 444f.; St. 220; W.St. 53.

7.7-9. I: Nicolaus Damascenus, *De plantis*, Arabic translation ed. and transl. by H.J. Drossaart Lulofs (*Nicolaus Damascenus: De Plantis. Five Translations*, Amsterdam, Oxford, New York 1989 = *Verhandelingen der Koninklijke Nederl. Ak. van Wet., afd. Letterkunde, nieuwe r.*139) p. 176f. § 148 and p. 186f. § 175; Vitruvius VIII 3-4 (cf. Strohm, *Theophrast* 287ff.); Olympiodorus in *Mete.* I 9. p.80.30-81.1 Stüve, with two more examples which may have been added by Olympiodorus himself as they are missing in Nicolaus and Vitruvius (cf. also ch. VII).

7.9-29. S: Aristotle does not discuss in his *Meteorology* the floating of clouds above air and its reason; he only declares that the heat of sunrays reflected from the earth dissolves the formation of clouds near the earth (340a29ff.; mentioned Dr.L. p. 444f.) and that in the same manner clouds are not formed in the upper region because there is not only air but also "a sort of fire" (Arist. *Mete.* 340b31-32). This declaration makes the formation and position of clouds dependent upon the influence of heat. Different from this Th gives a "mechanical" explanation of clouds "floating" above air and mentions three reasons:

1. the balance between the "quantities" of carrying air and floating clouds (7.10-23). Against Aristotle, *Mete.* IV 384b15-17 wood does not float in water because it contains air (s. Th 7.20f.). However, the mentioned principle of balance refers to a discussion in Aristotle's *Physics* (IV 8.215a25ff.) according to which the speed of a moving body in a medium depends on their magnitudes (216a15) and on the weight of moving bodies and the density of the medium respectively (cf. E.J. Dijksterhuijs, *Val en worp*, Groningen 1924, p. 18ff.; S. Sambursky, *The Physical World of the Greeks*, Princeton 1957; repr. 1987, p. 98f.); from this discussion Th

derives the floating of clouds on air if both are equal in their quantity, i.e. weight. At the same time he may have had in mind Anaximenes' cosmological doctrine of the earth-disk floating on air (see Aetius III 15.8) as well as the principle of ἰσοπορτία which according to Parmenides (see Aetius III 15.7) and Plato (*Phaedo* 109f.) causes the earth to stand still (cf. on this and on the principle of equilibrium, even in Epicurus' cosmology and its afterlife in Islamic times, H. Daiber, *Aetius Arabus*, Wiesbaden 1980, p. 432f.).

2. The second explanation of the floating of clouds (7.23-25) argues on the basis of the sideways movement of clouds which prevents their descent. This is a variant of the preceding declaration of floating and in addition includes—as the example of the arrow shows—the movement of thrown things caused by an impulse (cf. on this movement Arist. *Phys.* IV 8.215a1 and Sambursky l.c.).

3. The explanation that clouds are prevented from falling down because of the ascending vapors (7.26-27) can also be found in 6.50-57 and 11.4-7 and as in this chapter are based on the doctrine of “natural places” (cf. on this 6.43-46).

Th: besides the mentioned parallels in the preceding section cf. on 7.27-29 the passage 7.72-79. Therefore we should consider the possibility that 7.27-29 belongs to the following chapter on rain.

I: Plutarch, *Quaestiones graecae* 7 (*Moralia* 292C-D) mentions the floating of clouds on air as a theme of the “4th book of Theophrastus' Meteorology”; the mentioned “4th book” may be a mistake and anyhow does not enable us at the moment to reach any conclusions as regards eventual redactions or revisions of Th's *Meteorology*.

8. S: This chapter, like the following one on rain, snow, hail, dew and hoar-frost (chs. 9-12), is short because Th had discussed the topics already in his *Περὶ ὑδάτων* and because Aristotle had already explained them sufficiently (Arist. *Mete.* I 10-12). Th's remarks on rain make it clear that he keeps to Aristotle's explanation (*Mete.* 347a9ff.) of moisture raised by the heat and—after being cooled—descending as rain; however, he adds the principle of squeezing and accumulation (see Th 7.2ff.).

—I: Arrian see Stobaeus I 246.7 Wachsmuth; and see comment on 7.2-9; 7.7-9.

—L: St.19off.; 217ff. and above comment on ch. 7.

9. S: Arist. *Mete.* I 10.347b22f. —On air as cause of whiteness of snow (and hoar-frost: see 12.2-3) see Arist. *GA* 735b21; therefore it is against St. p. 192 (Cf. W.St. 53f.) not a discovery by Th; cf. already Hippocrates *Flat.* 14,101.6. —Against St. the text does not discuss the distinction between snow with fine and that with big flakes. —Th: *De causis plantarum* 5,13.7. —I: Epicur. *Ep. ad Pyth.* § 107; Arist. *Mu.* 394a33-36 (cf. Th *Mete.* 9.2-3; 10-11); Nicolaus Damascenus, *De plantis* Arabic version ed./transl. Drossaart Lulofs (see above note on 7.7-9) p. 186f. § 178 and p. 188 § 179; Seneca *Q.N.* IV b 3,3 and (on air in snow) 13,2; Plutarch, *De primo frigido* 16, 952A; id., *Quaest. conv.* VI 6,2 (p. 691 F); Arrian see Stobaeus I 247.3ff. —L: St. 192; W.St. 53f.

278 Theophrastus

10. L: St. 191;193f.; W.St. 55f.

10.2-3. S: Arist. *Mete.* I 12.347b36f.; cf. 348b18. —I: Epicur. *Ep. ad Pyth.* § 106.

10.3-4. S: Arist. *Mete.* 348a34-36. Against St. 194 Th does not differ from Aristotle. Th's remark that water by nature has a round shape has a parallel in Arist. *De caelo* 287b1-6. —I: Epicur. *Ep. ad Pyth.* § 106-107; Seneca *Q.N.* IV b 3,5. —L: St. 191;194; W.St. 55f.

11. S: Arist. *Mete.* I 10.347a18ff.: Aristotle's explanation that dew (δρόσος) is formed if vapor is condensed to water and if heat is not enough to raise it as vapor.

11.2-4. S: Arist. *Mete.* 347b14ff. —I: Arrian see Stobaeus I 247.2-4 (on the parallelism dew/hoar-frost—rain/snow). —L: St. 194-197.

11.5-8. Th: *Mete.* 7.26-27 and (on coldness in 11.5) *Mete.* 7.6.

12. S: Arist. *Mete.* I 10.347a16f. and 347b24 (cf. Th *Mete.* 12.2-3 and 5-6). New is the explanation of the white colour of hoar-frost; cf. on this ch. 9. and on the parallelism of snow/hoar-frost with rain/dew cf. ch. 11. —Th: *De causis plantarum* V 13.7. —I: Epicur. *Ep. ad Pyth.* § 109. —L: St. 192f.; W.St. 56f.

13. S: Starting-point is the doctrine that wind is moved air. This was already taught by Anaximander (see Aetius III 7.1) and was generally accepted in antiquity: cf. I.L. Ideler, *Aristotelis meteorologicorum libri IV.* I., Lipsiae 1834, p. 445f.; H. Strohm, transl.: Aristoteles, *Meteorologie. Über die Welt*, Berlin 1979, p. 156. Aristotle however had denied this and kept to the doctrine that wind is caused by dry ἀναθυμίασις (s. Arist. *Mete.* 349a16ff.; 360a27ff.). Although Th differs here from his teacher he took over Aristotle's doctrine of the two kinds of vapor, the fine, light and the thick, humid vapor (cf. comment on 6.41-57). Differently from Aristotle, (*Mete.* II 4.359b34ff.) he does not mention explicitly the sun, because in his opinion the sun primarily causes not winds but warm, fine vapor which arises under the influence of the sun: when wind is moved because of its lightness its movement is the result of ἀνταπόδοσις or *horror vacui* (on this see below 13.13). Its substance is dry and humid vapor and the activity of the sun is confined to a kind of συνεργεῖν: see Th *De ventis* 379.44-47 Wimmer; cf. St. 34f. and on the role of the sun in Th R.W. Sharples, 'Theophrastus on the Heavens,' in: Aristoteles. *Werk und Wirkung.* Paul Moraux gewidmet. I. Ed. by Jürgen Wiesner. Berlin, New York 1985 (p. 577-593) p. 579ff. —Contrary to Aristotle (*Mete.* 360a10-12), the humid, thick vapor below contributes to the formation of winds and does not only cause rain (cf. also Th *Mete.* ch. 7). —Th: *De ventis* passim, esp. 379.44-47; 382.38 Wimmer and the references given below. —I: Arist. *Mu.* 394b13ff.; Seneca *Q.N.* V 1ff. (referring to Posidonius; cf. on this Strohm, *Theophrast* p. 290ff. and St. 68); Adamantios *de ventis* 29.13-16 Rose (cf. St. 73). —L: Besides the literature given above and below cf. Strohm, *Zur Meteorologie* p. 251ff.; St. 25ff.; 53ff.

13.3-6. Th: *De ventis* 383.34ff. —I: Arist. *Mu.* 395a6f. —L: St. 56.

13.7-17. S: The example of the tube in which the water ascends if the air in it is extracted (13.14-17) refers to an old tradition, experiments with the clepsydra by Empedocles (*Vorsokr.* Diels/Kranz B 100,8ff.) and Anaxagoras (*Vorsokr.* Diels/Kranz A 68f.) Th: *De ventis* ch. 3 and 6 (cf. St. 57); on the force of vacuum (13.13), the ἀνταπόδοσις in Th's *De ventis* 378.44ff. Wimmer (cf. St. 30 and ff.), cf. *De ventis* V.383.35 Wimmer: πρὸς τὸ κενὸν ἢ φορὰ; IX.387.18 Wimmer: ἀντίρροια (cf. Strohm, *Zur Meteorologie* p. 266). —The Arabic text confirms— against F. Krafft, art. 'Horror vacui' (in: *Historisches Wörterbuch der Philosophie* III, Darmstadt 1974, col. 1208), Steinmetz's vindication (p. 29ff.) of the *horror vacui* for Theophrastus. —I: Arist. *Probl.* XXV.22. —It is quite possible that Th's theory of vacuum which dissociates him from Aristotle, influenced Erasistratos and Strato of Lampsakos; on both and on their doctrine of vacuum cf. David J. Furley, 'Strato's Theory of the Void,' in: *Aristoteles. Werk und Wirkung* [as in note on 13], p. 594-609, esp. 607f. —It may be worthwhile to mention the adoption of their ideas for their part in Philon of Byzantium, Ktesibios of Alexandria (3rd c. B.C.), Heron of Alexandria and later in the Islamic world: cf. H. Daiber, 'Farābis Abhandlung über das Vakuum: Quellen und Stellung in der islamischen Wissenschaftsgeschichte.' —In: *Der Islam* 60,1983, p. 39-47. —L: Strohm, *Zur Meteorologie* 256ff.; St. 30ff.

13.17-21. S: The described movements of winds either upwards or downwards or sideways (= λοξὴ φορὰ, as a result of the interaction between the warm and humid vapor) adapt in a summarizing manner the discussion on shooting-stars in Arist. *Mete.* 342a10ff. and 369a22ff. —Th: *De ventis* 22.381.12-19 Wimmer.—I: Arist. *Probl.* 25,14.939a38-b4; 26,48.945b30-34; Alexander Aphrodisiensis in *Mete.* 93.26-94.2 Hayduck; Adamantios *De ventis* 37.15ff. Rose; Olympiodorus in *Mete.* 97.5-17; 102.1-3; 175.6-11; 178.4-7 Stüve. —L: Strohm, *Zur Meteorologie* 255; 260ff.; Dr.L. 444,n. 32; St. 41-43; 58; 75f.

13.22-32. Th: The dependence of warm and cold winds on the place of origin and on the existence of hot or cold vapors is extensively and in a differentiating manner discussed in *De ventis* 1ff. where the peculiarities of the place and the sun appear as determining factors of winds. —L: St. 25ff.

13.33-42. Th: The Arabic word 'WRS can be identified with εὔρος which is mentioned in *De ventis* 387.25 Wimmer in the discussion of the πρηστήρες; these appear there as the result of the collision of νότος and εὔρος by which ships are destroyed. The description given by Th in his *Mete.* is more extensive than *De ventis*. —I: Seneca *Q.N.* V 13.4 (on the whirlwind as a result of the collision of different winds, description of *turbo*). —I: Alexander Aphrodisiensis in *Mete.* 112.26-34 (cf. 13.48-41).

13.43-54. S: Arist. *Mete.* III 1.370b17ff., different in details. —Th: *De ventis* § 53-54. 387.25ff. Wimmer; on the *horror vacui* (13.50) cf. 13.13 and comment. —I: Epicur. *Ep. ad Pyth.* § 104-105; Lucretius VI 426ff.; Seneca *Q.N.* V 13.3; Pliny

II 131-134 (cf. W. Kroll, *Die Kosmologie des Plinius*, Beslau 1930 = Abhandlungen d. Schlesischen Ges. für vaterländische Cultur, geisteswiss. R., 3. Heft, S. 36f.); Arrian see Stobaeus I 236-237 Wachsmuth.

14.2-13. According to Th the halo round the moon is not only an optical phenomenon; herewith he differs from Aristotle who uses the principle of ἀνάγκαις τῆς ὄψεως, *Mete.* III 3. —I: Epicur. *Ep. ad Pyth.* § 110; Seneca *Q.N.* I 2.1-7 (cf. N. Gross, *Senecas Naturales Quaestiones*, Stuttgart 1989 = Palingenesia 27, p. 38-40); Areios Didymos see *Doxographi Graeci* ed. H. Diels (Berolini 1958) 454.31-455.2 —L: St. 197-201. Cf. also below ch. VII.

14.14-29. S: this excursus interrupts the running text and seems to be a subsequent digression in Th's lecture on meteorology, actually belonging to the chapters on thunderbolts (ch. 6) and on εἶρος and *prester* (13.33-54). As the contrast "order" = "caused" by God and "disorder" = "nature of the world" shows, Th may have had in his mind some critique of the Aristotelian teleological principle without denying it totally; cf. also Th's *Metaphysics* 11b7ff.; S. Sambursky, *The Physical World of the Greeks* (Princeton 1956; 1987) p. 81ff.; 103; H. Happ, *Hyle*, Berlin-New York 1971, p. 772; G. Wöhrle, *Theophrasts Methode in seinen botanischen Schriften*, Amsterdam 1985, p. 85ff.; J.G. Lennox, 'Theophrastus on the Limits of Teleology,' in: *RUSCH* II, Brunswick-Oxford 1985, p. 143-63. —The text of the Arabic *Meteorology* mentions the distinction between "arrangement", "order" ascribed to God and "disorder" ascribed to nature as something which should not lead to the assumption (see Th 14.18ff.; 22ff.) that, e.g., meteorological phenomena are without any αἰτία—even if they happen in the view of human beings without any order and seemingly diminish God's power: for the plurality of causes may appear as irregularity. Thus, Theophrastus presupposes a strict separation between causality of nature and the metaphysical postulate of God as a kind of transcendent cause of order. This is apparently a reference to the discussion in Arist. *Metaph.* 982b24-983a11 and includes a critique of the Platonic notion of God who is τῶν δε κακῶν ἀναίτιον (Plato, *Rep.* II 379B; cf. *Tim.* 42D) and of the Platonic notion of man "being made like God" (cf. comment below on 14.28f.). —A confirmation of Th's separation between nature and God may be seen in Th's *Περὶ εὐσεβείας*; frg. 3 (see ed. and transl. by W.P. Pötscher, *Theophrastos' PERI EUSEBEIAS*. Leiden 1964) informs us that the *daimonion* which is "seemingly" (εἰκοι) "embittered" at the killing and the use of the killed as sacrifice has imposed the due punishment; at the same time Th considers famines and wars as the only causes of abnormal behaviour among human beings: they attack each other in insanity and finally kill themselves. What seems to be the anger by God (cf. Th's *Mete.* 14.22-23!) is replaced by the abnormal behaviour of mankind which is caused by famines and wars (cf. also *Περὶ εὐσεβείας* frg. 7). We may interpret this observation by Th as a tendency to replace "theological" explanations by a natural causality. Because God cannot be at the same time the cause of disorder—or better, irregularity,

as this is the result of many αἰτίαι—he becomes the cause of order. I: Arist. *Mu.* ch. 5 and 6, esp. 397a30ff. and 399a12ff.: all phenomena in the world (the author explicitly refers to meteorological phenomena in 397a19ff.) reflect “order” (κόσμος) and not disorder (ἀκοσμία 399a13f.), “seem to work its welfare” (ἔοικεν αὐτῇ πρὸς ἀγαθοῦ γινόμενα 397a31) and have one divine cause. In contrast to this Theophrastus does not stress God’s immanence; “order” is still ascribed to God but its contrary appears as irregularity which is caused by a plurality of causes. —Seneca *Q.N.* II 42ff.; VI 3 (cf. Gross [quoted 14.2-13] p. 247).

14.28-29. S: Theophrastus’ separation between God and nature (s. above) consequently leads to the critique of the Platonic notion of “being made like God” (ὁμοίωσις θεῷ *Pol.* 613B; *Theaet.* 176B).

15. The description of the four causes of earthquakes in 15.2-16 is not a doxography, as already stated by Strohm, *Zur Meteorologie* 408-410. According to Th earthquakes can have several causes—a statement which in Seneca *Q.N.* VI 20.5-7 is ascribed to Epicurus. —As in the chapters on thunder and lightning (s. comment on ch. 1 and 2) Theophrastus uses the principles of beating and friction and the elements air, water and fire (cf. below ch. VII). —L: cf. some preliminary remarks based on the shortened version by Bar Bahlūl in Strohm, *Zur Meteorologie* 407ff.; St. 205-211.

15.2-7. S: Anaximenes, see Aetius III 15.3, criticized by Aristotle, *Mete.* II 7.365b1-6. I: on 15.2-4 see Epicur. *Ep. ad Pyth.* § 105; Epicurus in Aetius III 15.11; Lucretius VI 536-547 (cf. Reitzenstein 33f.); Posidonius see D.L. 7.154.

15.7-9. S: Thales and Democritus, see Aetius III 15.1, criticized by Aristotle, *Mete.* 365b1-6.—I: Lucretius VI 552-56.

15.9-12. S: Anaxagoras, see Aetius III 15.4, and Aristotle himself, see Arist. *Mete.* II 8.—I: Arist. *Mu.* 395b33-37; Lucretius VI 591-593.

15.12-15. S: Anaxagoras, see Seneca *Q.N.* VI 9.1 = *Vorsokr.* Diels-Kranz II 26.38. —Aristotle mentioned fire incidentally (365b26) as the element which warms the wind and which is burning air because it is broken up in small particles and beaten (367a9-11). —Th: According to Th’s Περὶ πυρός 1 fire can produce itself, especially as a result of friction and pressure (cf. above, comment on 2.2-9); this can also happen below the earth, as volcanos show (see St. 211ff.). —I: Seneca *Q.N.* VI 9.1.

15.17-19. S: Arist. *Mete.* II 8.366a4-12. Th’s explanation is clearer than Aristotle’s theory of exhalation (ἀναθυμίασις) flowing either inwards or outwards (366a7f.). According to Aristotle, earthquakes are accompanied by calm if no wind enters earth or if a wind inside the earth is shaking the earth without finding a way out. Theophrastus has omitted Aristotle’s wind entering the earth.

15.22-25. S: Arist. *Mete.* 366a23-366b1. Th omits the sea as factor which thrusts back into the earth the violent wind.

15.26-35. S: This classification of earthquakes cannot be found in Aristotle; it is

the attempt to differentiate according to the strength and extent of earthquakes. Aristotle enumerates tremor (τρόμος) and throbbing (σφυγμός) as kinds of earthquakes (366b18f.) and mentions shortly afterwards as example an earthquake followed by a wind bursting through the earth into the air (366b32f.). Elsewhere (366b22-28) tremor is specified as horizontal (ἐπὶ πλάτος/μήκος) earthquake and throbbing as earthquake running vertically "upwards from below" (ἄνω κάτωθεν). We can compare Aristotle's "horizontal" tremor with Theophrastus' "kind of trembling", of which Theophrastus gives an additional specification (15.28-30). Aristotle's "vertical" earthquakes can be compared with Theophrastus' "earthquakes with inclination and with inclining movement" (15.31). Aristotle mentions as concomitant of vertical earthquakes the coming of stones to the surface of the earth (368b28f.; cf. also 366b31-367a6). Here Theophrastus differs from Aristotle; he distinguishes with the term "kind of inclination" (15.33) earthquakes with eruptions, i.e., with outcoming air or earthquakes with air inside the earth which is too weak to reach and beat other places of the earth (in a kind of horizontal earthquakes), from those with "inclination and inclining movement" (15.31) which in Aristotle are described as "horizontal" earthquakes.

15.28-30. I: Arist. *Mu.* 396a4 and 9-11 (on ἰζηματίαι and παλματίαι); Seneca *Q.N.* VI.2 (on *succussio*, ascribed to Posidonius) and VI 22.2 (description of *succussio* ascribed to Posidonius' pupil Asclepiodotus); Ammianus Marcellinus, *Res gestae* XVII 7.13 (on *chasmatae*).

15.31-32. I: Arist. *Mu.* 396a2-3 (on ἐπικλίνται); Lucretius VI 557-576; Seneca *Q.N.* VI 21.2 (on *inclinatio* ascribed to Posidonius); cf. VI 13.1 (on *interclusus*); Ammianus Marcellinus, *Res gestae* XVII 7.13 (on *climatae*).

15.32-35. I: Arist. *Mu.* 396a5 (on ῥήκται); Lucretius VI 577-590 (15.32-34) and 591ff. (15.34-35); Seneca *Q.N.* VI 21.2 (on *tremor*; *nec succutiuntur tunc omnia nec inclinantur sed vibrantur*; Seneca's own opinion); cf. VI 13.1 (*per angusta enisus*); Ammianus Marcellinus, *Res gestae* XVII 7.13 (on *brasmatae*). —L: cf. below ch. VII.

VII. THE IMPORTANCE OF THEOPHRASTUS' METEOROLOGY: SOME CONCLUSIONS

The Syriac translation, perhaps done by the Nestorian Job of Edessa at the beginning of the 9th century, the abbreviated Arabic translation by Bar Bahlūl, and above all the complete Arabic version by Ibn al-Khammār, both from the 10th century A.D., can be regarded as an adequate basis for the reconstruction of Theophrastus' lost *Meteorology*. We are aware of changes and mistakes by the oriental translators and transmitters and we now have a good idea of the text which may have been the original of the Syriac translation and both Arabic versions based on it. This original is—with only few exceptions which can be supplemented from the Syriac and the second translation by Bar Bahlūl—completely preserved in the Arabic version by Ibn al-Khammār.

The comparison of the Syriac translation with its Arabic versions enables us to answer the question whether the Syriac translator has shortened his Greek original or used a Greek text which is a summary of the original. H.J. Dossaart Lulofs¹¹⁸ and later H.B. Gottschalk¹¹⁹ doubted or denied the possibility that the Syriac version and the Arabic translation by Bar Bahlūl go back to a complete Greek text. Gottschalk thought of a late compendium and found in the Syriac text and the version by Bar Bahlūl "some evidence that some of the material ... did not come from a book by Theophrastus at all"¹²⁰. He referred to the explanation of the movement of winds by the *horror vacui* in the Syriac-Arabic version¹²¹ which in his opinion should not be attributed to Theophrastus but to his pupil Strato of Lampsacus. However, the argument is not convincing as we have found the principle of *horror vacui* also in other works by Theophrastus¹²². P. Steinmetz¹²³ has with good reason related the principle to Theophrastus' ἀνταπόδοσις. Moreover, the extensiveness of the explanation of *horror vacui* and the usual demonstration by example from the world of experience—the text mentions sucking water by means of a tube and herewith refers to an experiment common since Theophrastus' pupil Strato—are not compatible with the thesis that the Syriac-Arabic *Meteorology* contains later interpolations from the school of Strato. Such a statement would contradict Gottschalk's and Dossaart Lulofs classification of the text as possibly a Greek excerpt from Theophrastus' *Meteorology*. It is not imaginable that such a Greek excerpt at the same time adds explanations and considerations which are based on *horror vacui*.

In defending their doubts on the completeness of the Greek original used by the Syriac translator, Dossaart Lulofs¹²⁴ and Steinmetz¹²⁵ observed that according to Olympiodorus' commentary on Aristotle's *Meteorology*, Theophrastus demonstrated the formation of rain by πύλῃσις, using three examples of which only one, namely the condensation in bathrooms, is mentioned in the Syriac and Arabic translations. This argument too is not convincing for at least three different reasons: 1) Olympiodorus himself may have added two examples—an idea which gains credence from the fact that Nicolaus Damascenus and Vitruvius in their adaptation of Theophrastus' explanation of condensation only mention the example of the bathrooms¹²⁶. 2) As several scholars have remarked, Olympiodorus is not always careful in his rendering of other sources and perhaps had no access to Theophrastus'

¹¹⁸ Dr.L. p. 441f.

¹¹⁹ In: *Gnomon* 37,1965, p. 760f.

¹²⁰ In: *Gnomon* 37,1965, p. 759f.; cf. 39,1967, p. 24.

¹²¹ See Arabic translation 13.13 and 50 and comment on the English translation.

¹²² Cf. comment on 13.7-17.

¹²³ St. 30ff.

¹²⁴ Dr.L. 441f.

¹²⁵ St. 55.

¹²⁶ See my comment on 7.7-9.

*Meteorology*¹²⁷. 3) Olympiodorus may have taken additional material from Theophrastus' *Περὶ ὕδατων*¹²⁸; as in other cases we should not expect more than one example to be used in explaining meteorological phenomena.

The text used by the Syriac and Arabic translators can no longer be classified as an excerpt from a longer version. It is complete, as can be proved by a comparison with the (incomplete) summary of Theophrastus' *Meteorology* in Proclus' commentary on Plato's *Timaeus*¹²⁹. Besides, it is not plausible to assume additions to a Theophrastean original either in the Greek text translated into Syriac or in the Syriac-Arabic translation by Ibn al-Khammār¹³⁰. It cannot be maintained—as has been done by Wagner/Steinmetz¹³¹ and Gottschalk¹³²—that explaining lightning caused by friction by reference to the rubbing of wood by people in the desert is an addition by the Syriac translator or copyist; we can find the same example in Theophrastus' *Περὶ πυρός* I 1 and in Seneca's *Naturales quaestiones* II 22.1; the "people in the desert" may be a modification by the oriental translator as Seneca refers to the *pastores* "shepherds".

We can now say why the Syriac-Arabic *Meteorology* appears not to be a fully worked out treatise on meteorology and at the same time confirm our thesis that the Syriac-Arabic translation is not based on a Greek excerpt. The important point is that the literary character of the *Meteorology* is similar to other treatises by Theophrastus. These have been classified by Steinmetz¹³³ as "Vorlesungsmanuskripte", as drafts for lectures. Different from more extensive treatises¹³⁴, the *Meteorology* is a sketch for an oral report intended to convey information by means of illustrative examples. This becomes evident again and again from phrases like "we can observe something similar amongst us" (1.4); "now, suppose someone is sceptical and asks ..." (1.24f.); "when someone demands that we give the reason why ... we can answer" (6.67-69). —A further peculiarity which the *Meteorology* shares with other "Vorlesungsmanuskripte"¹³⁵ is the way in which new themes are begun abruptly without strong connections with the preceding chapter. Similarly we cannot find a logical sequence underlying the described meteorological

¹²⁷ Cf. Strohm, *Zur Meteorologie* p. 262, n. 24; O. Regenbogen in *RE Suppl.* VII, 1940, col. 1409: "an eigene Lektüre von Theophrasts Meteorologie durch Olympiodor ist nicht zu denken". Cf. also St. 42f.

¹²⁸ Cf. R. Sharples, 'Some Aspects of the Secondary Tradition of Theophrastus' *Opuscula. Theophrastean Studies on Natural Science, Physics and Metaphysics, Ethics, Religion, and Rhetoric*. Ed. by W.W. Fortenbaugh and R.W. Sharples. New Brunswick and Oxford 1988 (= *RUSCH* III), p. 41-64, here p. 44f.

¹²⁹ 176e (II 121.3 Diehl).

¹³⁰ An exception is Bar Bahlūl's translation; s. above ch. IV.

¹³¹ W.St. 37.

¹³² In: *Gnomon* 37, 1965, p. 759.

¹³³ St. 15ff.; cf. now also Konrad Gaiser, *Theophrast in Assos*, Heidelberg 1985, p. 35.

¹³⁴ Cf. St. 17ff.

¹³⁵ Cf. St. 19.

phenomena. The only apparent principle is the division of the phenomena into those above the earth (namely, thunder, lightning, thunderbolts, clouds, rain, snow, hail, dew, hoar-frost, winds, halo) and those below the earth (namely, earthquakes). This simple bipartition may have been most convenient for an oral discussion, a lecture. It is perhaps alluded to in Diogenes Laertius' mention (5.46) of Theophrastus' *Metarsiologika* as consisting of two parts. According to Diogenes Laertius they form the 7th and 8th part of Theophrastus' *Περὶ φυσικῶν*, a collection of originally single and not specially revised treatises, which are not to be confused with Theophrastus' *Φυσικῶν δόξαι*, his doxography¹³⁶.

The observation that Theophrastus' *Meteorology* is part of *Περὶ φυσικῶν* and not of his doxography can be confirmed from the contents of the Syriac and Arabic translations. Contrary to the opinion of G. Bergsträsser and most scholars afterwards¹³⁷, the Greek original was neither an excerpt from the doxography by Theophrastus nor a combination of doxography and theoretical discussions. And contrary to Steinmetz¹³⁸, we do not find side by side doxography, preliminary remarks and Theophrastus' own doctrine. As already stated by H. Strohm (1937)¹³⁹, the Arabic version contains Theophrastus' own meteorological doctrine which *integrates* older theories and is not a doxography.

The wrong classification of the Syriac-Arabic *Meteorology* as doxography was caused by misinterpreting the enumeration of causes of meteorological phenomena as an enumeration of opinions without mentioning their authors. This alleged omission as well as the alleged omission of Theophrastus' own opinion induced Steinmetz to assume that the oriental transmission of the *Meteorology* is affected by omissions and is nothing more than an epitome¹⁴⁰.

In his other scientific writings Theophrastus does not hesitate to consider a plurality of causes¹⁴¹; so too in the *Meteorology* he gives all the causes of the phenomena. In addition, he gives illustrative experiments for the student. He offers his aetiology because he is convinced that, e.g., thunder may have its origin in one of seven causes; each of these causes has the same result, the thunder. Sometimes the variety of causes may result in a variety of caused things. For example the wind differs according to the places in which it arises or according to the quality of air of which it is composed¹⁴².

As there is no reason to doubt the identity of Theophrastus' Syriac-Arabic

¹³⁶ Cf. St. 10-12.

¹³⁷ F. Boll in an epilogue to Bergsträsser's edition; E. Reitzenstein in 1924; W. Capelle, art. 'Meteorologie' in: *RE Suppl.* VI, col. 322ff.; G. Gottschalk, *Gnomon* 37, 1965, p. 760; Mayotte Bollack, *La raison de Lucrèce*, Paris 1978, p. 499f. etc. (s. also W.St. 5, n. 3)

¹³⁸ St. p. 55, W.St. p. 35.

¹³⁹ *Zur Meteorologie* p. 417ff.

¹⁴⁰ St. 178.

¹⁴¹ On this cf. St. 32f.; Georg Wöhrle, *Theophrasts Methode in seinen botanischen Schriften*, Amsterdam 1985, p. 145ff.

¹⁴² Cf. comment on ch. 13.

Meteorology with Theophrastus' Μεταρσιολογικά, we may now consider the possibility that Theophrastus' *Meteorology* was revised later and expanded into a more extensive treatise. This would provide an explanation of the fact that quotations from Theophrastus' *Meteorology* in Greek commentaries cannot be found in the Syriac-Arabic *Meteorology*. However, we have already mentioned that Olympiodorus' commentary on Aristotle's *Meteorology* may have used in its explanation of condensation Theophrastus' more extensive treatise Περί ὕδατος and not the *Meteorology*. Περί ὕδατος is lost in its Greek original, but was apparently more than once used as a source on meteorological questions; Plutarch's¹⁴³ short remark on floating clouds which are full of rain is said to be taken from an alleged 4th book of Theophrastus' *Meteorology*. It may go back to Περί ὕδατος which according to Diogenes Laertius (5.46) consisted of three parts and to which later the *Meteorology* may have been attached as a fourth part. We should also expect some information on floating clouds in Theophrastus' treatise Περί ἀνέμων; however, the remark at 378,9ff. Wimmer¹⁴⁴ was surely not Plutarch's. Περί ἀνέμων was perhaps composed after Περί ὕδατος, so that the discussion concerning the origin of rain in Περί ἀνέμων ch. 5 could remain incomplete, as the reader is referred to Περί ὕδατος.

It is a striking fact that in the Syriac and Arabic versions of Theophrastus' *Meteorology* the chapter on rain is confined to a short remark. This may be explained in a similar way: Theophrastus could refer his students to Aristotle with whom he agreed in this chapter; he could also cite his own Περί ὕδατος in which he had already extensively discussed rain. Since we can conclude from a passage in Seneca, *Naturales quaestiones*¹⁴⁵ that the year 310 B.C. is a terminus post quem for Περί ὕδατος, we may assume that Theophrastus' *Meteorology* must have been composed around 300 B.C. Because Theophrastus refers at the beginning of his treatise Περί ἀνέμων to a former discussion on ἡ τῶν ἀνέμων φύσις, ἐκ τίνων μὲν καὶ πῶς καὶ διὰ τίνας αἰτίας γίνεται, apparently to his *Meteorology*¹⁴⁶, we may finally conclude that the chronological sequence was Περί ὕδατος—μεταρσιολογικά—περί ἀνέμων; later authors may have drawn their knowledge of meteorological questions from one of these treatises. To them we can add Theophrastus' Περί πυρός which in chapter 1 presupposes the existence of Theophrastus' discussion of lightning and thunderbolts in his *Meteorology*¹⁴⁷.

It has become clear that we should take into account the existence of other and sometimes more extensive discussions of meteorological phenomena by Theophrastus. His *Meteorology* is only a sketchy draft prepared for a lecture. Later references to Theophrastus' *Meteorology* which we cannot trace back to the Syriac

¹⁴³ *Quaestiones graecae* 7 (*Moralia* 292C-D). Cf. above comment on ch. 7.9f.

¹⁴⁴ Cf. St. 29.

¹⁴⁵ III 11.3; cf. St. 28

¹⁴⁶ Cf. St. 9; 56.

¹⁴⁷ Cf. above, comment on 2.2-9.

and Arabic versions can be explained as echos of some other treatises by Theophrastus, above all *Περὶ ὕδατος* and *Περὶ ἀνέμων*.

In sum: The Syriac and Arabic versions of Theophrastus' *Meteorology* do not go back to a revised version, an epitome of which a more extensive original existed. They mirror the original of Theophrastus' lost *Meteorology*, the genuine doctrine of Theophrastus, and not a doxography. This too becomes clear from an analysis of its contents, e.g. of the chapters on thunder and lightning. In his account of the causes of thunder (ch. 1) Theophrastus mentions seven different causes: the collision of hollow clouds; the rotation of wind in hollow clouds; the meeting of fire and humid clouds, wind striking a broad and icy cloud; wind entering a cloud; wind leaving a cloud; the rubbing of clouds against each other. We detect here Theophrastus' principles¹⁴⁸ of *πληγὴ/συγκρουσμός* ("beating")¹⁴⁹—*τρίψις/παράτριψις* ("friction")¹⁵⁰—*σχισμός/ῥήξις* ("splitting")¹⁵¹ and *σβέσις* ("extinction")¹⁵²; we can add to them as factors the movement of air or winds in hollow or crooked clouds¹⁵³. The mentioned meteorological phenomena show—as to a certain extent the *Meteorology* of Theophrastus' teacher Aristotle¹⁵⁴—the dominant role of air/wind (= moving air)¹⁵⁵ as well as of fire and water¹⁵⁶. The principles and elements partially reappear in the account on the causes of lightning¹⁵⁷ and have—as regards beating and friction—a parallel in Theophrastus' *Περὶ πυρός* I¹⁵⁸. At the same time a number of explanations are inspired not only by Theophrastus' teacher Aristotle¹⁵⁹ but also by older, presocratic philosophers like Metrodorus¹⁶⁰, Heraclitus¹⁶¹, Anaximander¹⁶², Empedocles¹⁶³, Anaxagoras¹⁶⁴, his

¹⁴⁸ Cf W.St. 34f.

¹⁴⁹ See cause of thunder nr. 1 and 4.

¹⁵⁰ See cause of thunder nr. 7.

¹⁵¹ See cause of thunder nr. 6.

¹⁵² See cause of thunder nr. 3.

¹⁵³ See cause of thunder nr. 2 and 5.

¹⁵⁴ We find in Aristotle's *Meteorology* an introductory chapter on the elements which Aristotle seems to have added later: s. P. Steinmetz, 'Ansatzpunkte der Elementenlehre Theophrasts im Werk des Aristoteles' —In: *Naturphilosophie bei Aristoteles und Theophrast*. Verhandlungen des 4. Symposium Aristotelicum veranstaltet in Göteborg. August 1966. Ed. by I. Düring. Heidelberg 1969, p. 224-49, esp. p. 233ff.

¹⁵⁵ See cause of thunder nr. 2, 4, 5 and 6.

¹⁵⁶ See cause of thunder nr. 3 and 4 and the other causes in which air/wind may be warm/light or humid/heavy.

¹⁵⁷ See comment on ch. 2.

¹⁵⁸ See comment on 2.2-9.

¹⁵⁹ Cf. cause of thunder nr. 2, 4, 5 and 6 with Arist. *Mete.* II 9.369a35-bl.

¹⁶⁰ Cf. cause of thunder nr. 4 5 and 6.

¹⁶¹ Cf. cause of thunder nr. 1, 2 and 5.

¹⁶² Cf. cause of thunder nr. 6.

¹⁶³ Cf. cause of thunder nr. 3.

¹⁶⁴ Cf. cause of thunder nr. 3.

pupil Archelaus¹⁶⁵, Leucippus¹⁶⁶ and Democritus¹⁶⁷. Their theories are described in Aetius' *Placita philosophorum* which may be influenced by Theophrastus' Φυσικῶν δόξαι.

In his *Meteorology* Theophrastus relies not only on older material, on ideas of his teacher Aristotle, on presocratic philosophers, but also on known explanations as found in Greek classical literature. Theophrastus' picture of heated iron which thrown into water makes a noise (ch. 1.9-11) reminds us of Homer, *Odyssey* IX 391, where the hissing sound of the glowing pale in the eye of Cyclopes is compared with the noise which arises if the iron-smith dips a hatchet or a pole into cold water and hardens it. Similarly we can find in Aristophanes' *Nubes*¹⁶⁸ parallels to Theophrastus' explanation of thunder and lightning as results of collision and splitting up of clouds. Aristophanes may be relying on Anaxagoras and this hints at the dissemination of presocratic theories during the time of the comic poet. Theophrastus too was not afraid to incorporate presocratic explanations into his own physical world-view. He did so without mentioning their authors: this was not essential in a book on possible causes of thunder and lightning. Moreover, the student could be referred to his book on Φυσικῶν δόξαι.

Earlier theories serve as material for Theophrastus' aetiology, for his enumeration of all causes which have the same result, e.g. thunder and lightning, perhaps with some modifications as the mentioned illustrative examples suggest. The assumption that Theophrastus aimed at a description not only of all possible causes but also of all possible modifications of the caused phenomena seems confirmed by the chapter on the causes of *different* winds (ch. 13). It does not concentrate on the general cause of vapor of which wind is composed, namely the sun; rather it enumerates all factors which cause *different* winds, namely its composition of fine/hot and thick/cold vapor and the interaction between both kinds; the places from which winds arise; the already mentioned *horror vacui* and the rotational movement of air. This differentiation, like that of the causes of thunder and lightning, cannot be found in the *Meteorology* of Theophrastus' teacher Aristotle (*Mete.* II 4-6). In that work attention is paid only to the twofold nature of vapor; the role of the places from where a wind arises is not systematically developed; the *horror vacui* and the rotation of air are not even mentioned.

On several occasions Theophrastus recurs to doctrines put forward by his teacher; however, he has modified and supplemented them. Sometimes Theophrastus indirectly criticizes Aristotle by putting forward a different doctrine. For example in the chapter on the reason why lightning precedes thunder we can see that Theophrastus has abandoned Aristotle's explanation (*Mete.* II 9) of the origin of thunder before lightning; his report includes Aristotle's explanation that our

¹⁶⁵ Cf. cause of thunder nr. 3.

¹⁶⁶ Cf. cause of thunder nr. 3.

¹⁶⁷ Cf. cause of thunder nr. 7.

¹⁶⁸ 375f.; 404ff.

perception of lightning is quicker than our hearing of thunder, but he adds that lightning precedes thunder or both may arise at the same time.

Theophrastus starting-point is Aristotle's *Meteorology*; its doctrine is put forward with additions and systematic modifications. This impression can be confirmed from Theophrastus' reports on clouds, rain, snow, hail, dew and hoar-frost (ch. 7-12). We can find new elements not only in the accounts on thunder (ch. 1), lightning (ch. 2-5), thunderbolts (ch. 6) and winds (ch. 13), but also and above all in the reports on the halo around the moon (ch. 14) and on earthquakes (ch. 15). It is clear that Theophrastus abandoned Aristotle's explanation of the halo as a reflexion (ἀνάκλασις) of the visual rays¹⁶⁹; he assumed that the moon-rays work an effect on the thick air which surrounds the moon, and he illustrates this with the waves caused by a stone which is thrown into water. Theophrastus further assumed, as this example shows, that moonlight possesses a power which moves thick air in such a manner that it is replaced by thin air in a circular shape around the moon. This new idea seems to be a conception which is developed parallel to the Platonic-Aristotelian definition of sound as moved air¹⁷⁰; this definition of sound reappears among others¹⁷¹ in Theophrastus' pupil Strato¹⁷². It is now remarkable to find in the introduction to Heron of Alexandria's *Pneumatica*, a summary of Strato's physics, light and heat defined as a δύναμις σωματική which occupies place and permeates all bodies like the blow of a ray¹⁷³. In view of the chapter on the halo in Theophrastus' *Meteorology* it seems to be possible that this conception of light as a moving power ultimately can be traced back to Theophrastus who developed it, perhaps inspired by the Platonic definition of sound as moved air.

The chapter on the halo is the last one on meteorological phenomena above the earth. Before Theophrastus proceeds to the subterranean phenomena he inserts, according to the Arabic version by Ibn al-Khammār, a passage which at first sight seems to be a later addition; however, a closer look points at a Theophrastean origin. The text distinguishes between "arrangement" or "order" ascribed to God and

¹⁶⁹ Arist. *Mete.* III 2-3.

¹⁷⁰ Cf. Plato, *Tim.* 67b3; Theophrast., *De sensu* (*Doxogr. Graeci* 500,14 Diels); Aetius IV 20.1; Arist. *De anima* 420b7.

¹⁷¹ Cf. H. Flashar (transl.), *Aristoteles Problemata physica*, 3d ed. Darmstadt 1983 (= Aristoteles. Werke in deutscher Übersetzung 19), Probl. XXI 23 and commentary. — Aetius IV 19.4 ascribes to the Stoics a similar theory (on this cf. M. Pohlenz, *Die Stoa*, 5th ed. Göttingen 1980, I 39; II 22) and uses the same picture as Theophrastus, the example of a stone which is thrown into water causing wavelike circular movements. — It seems that Epicurus too in his definition of sound as πνεῦμα and in his allusion to a fuller who blows on clothes (see Aetius IV 19.2)—namely water, as Seneca *N.Q.* I 3.2 shows—recurs to a Theophrastean principle which appears to be integrated in an atomistic theory of sound and hearing. On Epicurus' atomism cf. here W.K.C. Guthrie, *A History of Greek Philosophy* II, (Cambridge 1965 (repr. 1974), p. 447f. and K. von Fritz, p. 614, n. 48.

¹⁷² Cf. F. Wehrli, *Die Schule des Aristoteles*. V², Basel 1969, 74.

¹⁷³ Cf. Heron, *Pneumatica* 24-26 Schmidt and A.E. Haas, 'Antike Lichttheorien' (in: *Archiv für Geschichte der Philosophie* 20, Berlin 1907, p. 345-86), p. 378f.

disorder of the world ascribed to nature. The disorder or irregularity has natural causes and should not be attributed to the “anger” of God. The distinction between God and nature saves God from any diminution of his divine power. This appears to be Theophrastus’ own solution to the Peripatetic discussion about teleology of which we find an echo in Theophrastus’ *Metaphysics*¹⁷⁴; there too Theophrastus distinguishes between God and nature which sometimes seems to be disorder and purposeless activity. In our text any disorder appears in fact as a kind of irregularity provoked by a plurality of causes; like perishability it cannot be attributed to God—no more than godlikeness can be ascribed to human beings.¹⁷⁵

The last chapter of Theophrastus’ *Meteorology* discusses the causes of earthquakes. As it is missing in the Syriac manuscript it was till now only known from Bergsträsser’s edition of the abridged translation by Bar Bahlūl. In the complete translation by Ibn al-Khammār many details are now much clearer. Theophrastus’ starting-point is Aristotle’s theory of subterranean ἀναθυμίασις¹⁷⁶ as a cause of earthquakes; however, he replaces ἀναθυμίασις with wind, moved air and no longer explains earthquakes as a result of humid and dry ἀναθυμίασις entering the earth from above. Furthermore, he adds underground water and fire as moving powers. Thus, he can enumerate four possible causes: collapsing hollows in the earth; moving water; wind below the earth which looks for an exit; fire dissolving air which seeks more space.

In his aetiology, Theophrastus apparently had in mind certain explanations of earthquakes given by predecessors: namely Anaximenes with regard to the dryness of earth; Thales and Democritus with regard to water; Anaxagoras, but also Aristotle with regard to air and wind; and Anaxagoras with regard to fire.

After the introduction of the elements as causes of earthquakes, Theophrastus adds an explanation why earthquakes are sometimes accompanied by winds coming out of subterranean hollows, and sometimes not, namely when winds are restrained inside the earth for different reasons.

Finally, he offers a description of three different kinds of earthquakes: 1. earthquakes of the trembling kind, when hollows collapse; 2. earthquakes with inclination and inclining movement, when an underground wind beats the earth without finding an exit; 3. earthquakes with inclination but without movement, if the subterranean wind beats the earth but is not thrown back as it can find an exit immediately—it “gets in touch with the air” above the earth—or “becomes weak” (15.33f.).

For the interpretation of this description we should look more closely at Aristotle’s discussion of earthquakes¹⁷⁷ and include a passage in *De mundo*¹⁷⁸ which

¹⁷⁴ 11b7ff.

¹⁷⁵ For further details cf. above comment on ch. 14.14-29.

¹⁷⁶ Cf. Arist. *Mete.* II 7-8.

¹⁷⁷ Cf. my comment on ch. 15.

¹⁷⁸ 395b-396a.

is ascribed to Aristotle¹⁷⁹ and which according to H. Strohm¹⁸⁰ is influenced by Theophrastus. A comparison with the complete version by Ibn al-Khammār allows us to identify the Greek terms of Theophrastus' tripartition of earthquakes:

Earthquakes with trembling earth and collapsing hollows reappear in *De mundo* as ἱζηματίαι "sinking earthquakes" (396a4); the qualification of these earthquakes as a kind of "trembling" reappears in *De mundo* (396a9-11) in the description of "oscillating earthquakes" (παλματίαι) which effect "a sort of trembling" (τρόμω πάθος ὅμοιον ἀπεργαζόμενοι).

Theophrastus' second kind of earthquake, classified as "inclination with an inclining movement" reappears in *De mundo* 396a2-3 as ἐπικλίνται "horizontal earthquakes" which "shake the earth obliquely at a very acute angle" (οἱ μὲν εἰς πλάγια σείοντες κατ' ὀξείας γωνίας); the author of *De mundo* adds the βράσται "heaving earthquakes", those which "blast upwards and downwards perpendicularly"; they are not mentioned explicitly by Theophrastus, for they are included in his second kind.

The third kind of earthquake, classified by Theophrastus as having "inclination without inclining movement" is caused by a subterranean wind which is either too weak or which leaves the earth through openings. In *De mundo* (396a5) they are called ῥήκται "splitting earthquakes".

To these earthquakes the author of *De mundo* adds two more kinds, the ὄσται "thrusting earthquakes" and the μυκῆται σεισμοί "roaring earthquakes". However, both kinds as well as the already mentioned παλματίαι and βράσται can be regarded as variants of Theophrastus' three kinds of earthquakes.¹⁸¹ Thus, Theophrastus and after him the author of *De mundo* have added to Aristotle's bipartition of earthquakes into those which shake the surface of the earth and those which split it.¹⁸² They offer as a third kind trembling earthquakes with collapsing hollows. Theophrastus compares them with the trembling movement of stones in a column when a single stone comes loose and falls down.

This comparison reminds us of Seneca, *Naturales quaestiones* VI 21.2 and 22: Seneca mentions three kinds of movements of the earth caused by earthquakes: 1) the *vibratio* (literally: *omnia ... vibrantur*) which causes minimal damage and which may be compared with Theophrastus' "inclination without an inclining

¹⁷⁹ On date and authorship cf. the not yet finished discussion in P. Moraux, *Der Aristotelismus bei den Griechen von Andronikos bis Alexander von Aphrodisias*. II, Berlin-New York 1984 (= Peripatoi 6).

¹⁸⁰ In his commented German translation while comparing Bar Bahlul's version of Theophrastus' *Meteorology* and Seneca, *Naturales quaestiones* (in: *Aristoteles: Werke in deutscher Übersetzung* 12, 2nd, rev. ed. Berlin 1979, p. 318ff.).

¹⁸¹ Therefore, I disagree with Strohm in his already mentioned commentary on *De mundo* p. 320 that the author of *De mundo* had in his mind a bipartition of earthquakes into those which shake the surface of the earth and those which split it.

¹⁸² Cf. Arist. *Mete.* 368b22ff. and my comment on ch. 15.

movement" (15.32f); 2) the *inclinatio* by which "the earth leans to one side or the other like a ship" (*qua in latera nutat alternis navigii more*) and the *succussio* or *motus quatiens* during which under the earth "from overhanging cliffs something may be loosened and fall with great crash and noise into the cavern lying below. The greater the weight or the height the more violently it comes down. And thus the whole roof of the underground valley is moved"¹⁸³.

The comparison of Theophrastus' Arabic *Meteorology* with *De mundo* and with Seneca's *Naturales quaestiones* is useful for the interpretation and for the investigation of the sources of both texts. However, we must still look for an explanation of the divergences among all three texts. We might be tempted to posit the existence of some other text by Theophrastus on earthquakes or on meteorology which perhaps was more extensive than the Arabic version. But perhaps we should look again at Seneca's *Naturales quaestiones* where we find *succussio* and *inclinatio* ascribed to Posidonius and—as regards the description of *succussio*—to Asclepiodotus, the pupil of Posidonius. To these two kinds of earthquakes Seneca adds as his own opinion a third kind, the *vibratio*. It seems then that Seneca did not have direct access to Theophrastus' *Meteorology*; he may have known Theophrastus' *Doxography* (Φυσικῶν δόξαι) and Posidonius' adaptation of Theophrastus' *Meteorology*¹⁸⁴. A confirmation of this may be seen in the doxographical information that Seneca provides on earthquakes¹⁸⁵ and above all in Seneca's inaccurate report¹⁸⁶ that Aristotle and his pupil Theophrastus share the same doctrines on earthquakes; Seneca gives a summary which follows Aristotle's *Meteorology* (II.368b23ff).

Here, as in the case of *De mundo*, we must be cautious in reconstructing Theophrastus' *Meteorology* from quotations and reports in later sources. The Syriac-Arabic version by Ibn al-Khammār has turned out to be the most reliable basis for source-critical studies. And while we cannot completely exclude the possibility of omissions in the Greek original used in the Syriac-Arabic translations, we can say that the Syriac-Arabic translation by Ibn al-Khammār must be regarded as primary for future research.

Theophrastus' *Meteorology* has influenced later authors till the 6th century A.D.

¹⁸³ Seneca *N.Q.* VI 22.2. The English translation follows T.H. Corcoran in The Loeb Classical Library, London-Cambridge/Mass. 1972.

¹⁸⁴ Already Strohm (*Zur Meteorologie* 410, n. 48) remarked that Posidonius' distinction between *succussio* and *inclinatio* can be traced back to Theophrastus. On Posidonius indebtedness to Theophrastus cf. also Strohm 423, n. 69, id., *Theophrast* and already H. Diels, *Doxographi graeci*, Berolini 1879 (repr. 1958), p. 229. —I.G. Kidd, *Posidonius* (I-II, Cambridge 1972 = Cambridge Classical Texts and Commentaries. 13; 14A) noted the deviations of Posidonius' meteorological theories as described in Seneca from Aristotle and from the Stoics, but did not refer to Theophrastus' *Meteorology* (cf. e.g. Kidd II p. 509 and 514).

¹⁸⁵ Seneca *N.Q.* VI 9ff.

¹⁸⁶ *N.Q.* VI 13.1

Traces can be found already in Epicurus, then in Strato of Lampsacus; the compiler of the Aristotelian *Problemata physica*; the author of *De mundo*; the Stoics, above all Posidonius; Lucretius; Nicolaus Damascenus; Seneca; Arius Didymus; Vitruvius; Pliny; Plutarch; Flavius Arrianus (2nd c. A.D.¹⁸⁷); Alexander of Aphrodisias; Ammianus Marcellinus; Galen; Adamantius; Proclus; Philoponus and finally Olympiodorus. They all testify to the extreme importance of Theophrastus in the history of meteorology after Aristotle.¹⁸⁸

¹⁸⁷ Cf. A. Brinkmann/H. Herter, 'Die Meteorologie Arrians,' in: *Rheinisches Museum für Philologie* N.F. 73,1924, p. 373-401; 74,1925, p. 25-63. We have quoted in our commentary the Stobaeus-text ed. by Wachsmuth; he is the basis-text in the collection by Brinkmann/Herter.

¹⁸⁸ On Theophrastus' influence cf. generally St. 329ff.

Theophrastus' *Meteorology*, Aristotle and Posidonius

I.G. Kidd

I must first define my limitations, orientation and purpose. I have no intention of attempting a rounded account or analysis of Theophrastus' *Meteorology*. My interest lies with the content and form of Theophrastus' *Meteorology* as reported in the Syriac and Arabic translations. Since I do not read Syriac or Arabic, I can not be concerned with problems relating to critical details of text and collation of the primary evidence. Furthermore, my investigations were first based on the translations of Bergsträsser (*Neue meteorologische Fragmente des Theophrast*, Heidelberg, 1918) and Steinmetz (*Der syrische Auszug der Meteorologie des Theophrast*, Mainz, Wiesbaden, 1964), only supplemented belatedly in summer 1989 by an interim report of the important work of Dr. Daiber in his draft version formed from recently discovered Arabic translations in India (see p. 218); but I do not yet know the details of these collations. Also I came to this material from Posidonius' engagement with meteorology in the first century B.C. For, as has been well shown and documented, the Theophrastus fragments have quite startling and extensive similarities in Lucretius VI, and even a doublet in Vitruvius (VIII.2.3), and so seemed to reverberate in the early part of the first century B.C. Was it then part of an Aristotelian revival? But this is where the material roused my interest and astonishment. For in this subject Posidonius, for example, turns out to be far more Aristotelian than Theophrastus is, if the fragment is indeed a faithful account of Theophrastus' *Meteorology*. The latter in content, form and method seems divorced from Aristotle's *Meteorology* and its later influence to a surprising extent. Now, I am well aware of the dangers of interpretation of material from such uncertain origins, context and transmission. It still seems to me an open question as to what extent the evidence may be a collection (cf. Gottschalk, *Gnom.* 37 (1965), 759 f.), or how diluted, composite, garbled, epitomised or faithful a survival it is of an ultimate Theophrastean original. But supposing it does reflect a Theophrastean work on meteorology, my very limited purpose is to select a few reactions from parts

of the fragment when compared with earlier Aristotelian theory and presentation on the one hand, and on the other to later meteorological accounts in the first centuries B.C. and A.D.

The first thing that strikes me is the strange order of the fragment. No doubt this is very shaky ground considering the unknown transmission; but if you are making a copy, or even an epitome, you usually keep to the order of what is before you. And whether the fragment is lacunose or abbreviated, we do have the beginning; and the meteorology begins with thunder, lightning and thunderbolts. Of all other survivals only Lucretius does that; and he clearly does so because he is writing from the angle of superstitious fears. The fragment continues: the clouds, rain, snow, hail, dew, frost group; wind, *prester*; halo; earthquakes. This is totally unlike Aristotle with his presentational development from the two exhalations; and indeed it is unlike other extended surviving accounts such as *De mundo* and Seneca *NQ*. There are some similarities in order (not content) to the Aëtian group, but there are differences too. On the other hand, in spite of marked content similarities with Epicurus' *Letter to Pythocles* (Ep. *Pyth.*) there is no comparison in order there (but the order of Ep. *Pyth.* is chaotic anyway); nor is there with the Stoic account in D.L. VII.151-4. The only possible pattern I can see in the Theophrastean order is elemental: fire, water, air, earth. And then the beginning may perhaps be explained by the preeminence of fire (cf. *De igne* 1).¹

Another obvious oddity of general form is the extreme unevenness and imbalance of treatment of the different sections. The section on thunder, lightning and thunderbolts takes up almost half of the whole account (and that with particular expansion of thunderbolts), in comparison with brief or truncated presentation or even omission of some items which are of regular and central inclusion in meteorological treatises. There may be explanations for such discrepancies; after all, Lucretius devotes 219 lines to thunderbolts, and 8 lines to snow, winds, hail, frost and ice. But for what is assumed to report a philosophical/scientific pamphlet on meteorology, the surviving form raises questions of composition and transmission which fortunately do not concern me here, since enough remains for comparison with Aristotle and Posidonius on content and methodology.

I should say at the start that I am convinced that Posidonius had read and was influenced by Aristotle's *Meteorology*. It is necessary to make such claims these days after Sandbach's *Aristotle and the Stoics*. The evidence for this is accumulative (Kidd, *Posidonius*, vol. II.84 ff.), combined with a striking harmony in meteorological theory. By that I do not mean that Posidonius is a reproduction of Aristotle; but he looks like a development from him.

As for Theophrastus, it has long been thought (and certainly most discussed) that the clearest and most detailed evidence occurs at the beginning of the fragment

¹ On the order of the presentation of meteorological phenomena, see the Appendix on p. 305.

with thunder, lightning and thunderbolt, and at the end, on earthquakes. But first I want to start from more uncertain but intriguing evidence, from a class of phenomena which Aristotle regarded as optical, not substantial. But of that Aristotelian class we have only one instance in the Theophrastean fragment, namely halo, which Aristotle explained (*Meteor.* III.3), and so did Posidonius (F133 EK), by an optical theory of reflection: our sight rays (or vision) reflect from a mist cloud to the luminary (sun, moon, star). The atmospheric conditions are physical, but the theory is an optical mirror reflection theory (ἀνάκλασις). Theophrastus is quite different; the explanation seems physical: a circling or wave movement round the moon creates a belt of finer particles surrounded by a belt of denser particles, so that the vapour round this part *becomes* a halo (cf. *Ep. Pyth.* 110). Seneca (*NQ* I.2) seems to criticise such a theory by insisting that such denser belts of atmosphere could only occur nearer the earth (i.e. not round the luminary), and our vision is misled by reflection. Also, Alexander (F133.27 ff. EK) classified Aristotle and Posidonius against another group which held a theory that compared the phenomenon to objects seen through water. This is refraction (κατάκλασις; cf. *Aët.* III.18) which the Schol. in *Arat.* 811, p. 488.21 ff. Maass, distinguished (ἦτοι ἐνδοτέρω διαδύεται οἶον εἰ ἐγκατακλωμένη) from mirror reflection phenomena. That διαδύεται reminds me of Theophrastus on the shape of the halo in Arabic, Bergsträsser §§ 59-60, a version which seems to have disappeared from Daiber's new draft translation: "The light of the moon pierces (penetrates) the vaporous haze around it in equal lines". (Aristotle, 373a2 ff., explained the shape by reference to the fact that reflection is symmetrical on all sides; both used a mathematical linear theory.) So we have an incipient physical refraction phenomenon: "When the vapour is fine, brightness penetrates more for a wider halo; when the vapour is dense, the light does not penetrate so much, and so a narrower halo results." A sentence in Arius Didymus F14 (*DG* 454.31 f.), sometimes taken to be Theophrastean, looks like a confusion of the two theories: συμβαίνειν δ' ὅταν διὰ τοῦ περίξ ἀέρος ἀχλυώδους ὄντος ἐπιλάμπηται τὸ φῶς αὐτῶν. In fact, Arius' eventual explanation is optical (*DG* 455.1).

The other phenomena usually found in this group force sheer guesswork. None appear in Lucretius either, who is not interested in such phenomena; but they do appear in *Ep. Pyth.* For rainbow, Aristotle (*Meteor.* III.4-5) again gave an optical mirror reflection theory of sun on a moist cloud. So did Posidonius (Frs. 15, 134 EK), but he differed on how the reflection was produced. Aristotle thought of reflection in myriad individual drops in the cloud; Posidonius believed that the surface of the cloud as a whole was the reflector. So while Aristotle is preoccupied by trying to explain the colour of the rainbow (373b ff.), Posidonius tries to explain its shape, how an arc can be a reflection of an orb. His answer is, by the shape of the cloud, like a hollow round mirror with the form of a ball cut in half. While *Aët.* III.5 seems to follow the drop theory (*DG* 372.31 f.), Posidonius is followed this time by *De mundo* (395a33 ff.), and the hollow cloud is in Pliny (*NH* 2.150).

It is also (together with an actual word of the cloud, *δεδροσισμένω*, used by Posidonius [Kidd, *Pos.* II.124]) what you find in the distortion of the Aristotelian theory of the rainbow in Ar. Did. F14 (*DG* 455.14-16). This is a Stoic/Posidonian distortion, not Theophrastean. And in general I agree with Moraux (*Der Aristotelismus*, I.289 ff.) and Gottschalk (*ANRW* II.36.2, 1126; *Gnom.* 39 [1967], 22) that the meteorological fragments (Frs. 11-14) of Arius Didymus are not evidence for Theophrastus. But on the other hand, Ep. *Pyth.* 109 seems to suggest that the air *was* coloured by the light of the sun; and Seneca's argument in *NQ* I.5 suggests that he knew such a theory; and Olympiodorus, *In Meteor.* III.2, p. 210.15 ff. Stüve, also records a refraction as opposed to a reflection theory. Ps.-Arist. *Problem.* 12.3, 906b5 ff., while putting forward a reflection theory, seems to leave the question open. When compared with our discussion on halo, could this hark back to Theophrastus? Parhelia (mock suns) again are explained by Aristotle (*Meteor.* III.6) as purely optical reflection phenomena; so too Posidonius (F121 EK) probably (Kidd, *Pos.* II.467 ff.), and certainly Seneca (*NQ* I.11 ff.), and Ps.-Arist. *Problem.* 15.12, 912b27 ff. But someone (Schol. in Arat. 811, p. 488.14 ff. Maass) thought of them as *both* κατ' ἔμφασιν καὶ καθ' ὑπόστασιν. Could this arise from a Theophrastean multiple choice method (see below)?

On the other hand, the Milky Way (not in Ep. *Pyth.*, Lucretius, *De mundo*, or Seneca) for Aristotle and for Posidonius is substantial, καθ' ὑπόστασιν, not an optical illusion (Arist. *Meteor.* 345b10; Frs. 129, 130 EK). Posidonius' accumulation of fire (πυρὸς σύστασις, F129 EK) or flow of stellar heat, is quite individual in detail, but still recognisably from Aristotle's stable. Theophrastus (Macr. *Somn. Scip.* I.15.4) is again quite different: the suture of the two hemispheres of the celestial sphere. I only mention this nonsense, because I have argued elsewhere (*Pos.* II.487 f.) that the Macrobius doxography probably comes from Posidonius (so also Diels, *DG* 209; *RhM* 34 (1879), 489). If so, Posidonius knew something of Theophrastus' meteorology (although the Milky Way is not in the Syriac/Arabic fragments), but sensibly stuck to Aristotle.

We know nothing at all about whether Theophrastus had any views on comets. As Steinmetz pointed out (*Die Physik des Theophrast*, p. 216 f.), they do not appear in Proclus' long list, *In Tim.* 35A = II.120.29D. All we can say is that by Posidonius' time a triple classification of theories was common (Kidd, *Pos.* II.493): (1) that they were planets, (2) an optical effect created by planets; or (3) the sort of theory held by Aristotle (*Meteor.* 344a16 ff.; cf. 341b36 ff.) and Posidonius (Frs. 131, 132 EK), that they arose from a spinning bit of dense ἀήρ in αἰθήρ, expanding and decreasing through sustenance. However, Ep. *Pyth.* 111 gives a quite different triad: (1) fire nourished in the heavens in certain places at certain times, or (2) because of a peculiar motion of heaven at intervals which makes such stars appear, or (3) stars themselves set in motion under certain conditions come into our view. Could these be indications of alternatives entertained by Theophrastus? Comets do not occur in Lucretius. It seems that Seneca (*NQ* VII.22) was the first to argue

that comets are true celestial bodies, but distinguished from planets through the different nature of their orbits.

A brief word on snow and hail will suffice for my purpose. Everyone agreed with Aristotle (*Meteor.* 347b23) that snow comes from a freezing cloud, but the question remained: what was the process of formation of the flakes? Did this happen (a) before the cloud liquefied, or (b) after liquefaction had begun. Most plump for one or the other, for example, *De mundo* 394a33 and Arrian, *Stob.* I.247.5 for (a), and Posidonius (F11 EK, Kidd, *Pos.* II.115) for (b). But *Ep. Pyth.* 107 gives both (with another triad of explanations), and so too, I think, did Chrysippus (*Ar. Did.* F35 = *Stob. Ecl.* 1, p. 245.27 f. W = *SVF* II.701). Theophrastus is most unclear here, but some versions have suggested the double presentation (Wagner/Steinmetz Syriac 353a18-20). His preoccupation with air in regard to the natural characteristics and colour in snow originates in Aristotle (*GA* 735b21, complete with illustrations; and compare Aëtius III.4 for Anaximenes and Anaxagoras), but the theories and analogies are stock by the time of *De mundo* (394a35) and Arrian (*Stob.* I.247.6 ff.). Again with hail, the ongoing argument concerned the process of ice formation. Was it liquefaction to frozen drops, a wet cloud consisting of drops freezing (Aristotle, *Meteor.* I.12, 348b16 ff.), or a frozen cloud defreezing to semi-liquefaction (Posidonius, F136 EK; Kidd, *Pos.* II.513 f.)? Theophrastus' catalogue this time survives in his explanations for the roundness of hailstones. The three accounts he lists are incompatible in the sense that they would depend on different theories of the formation and cause of hail: (1) they are rounded by the friction of their descent; i.e. they are already frozen ice (argued against by Aristotle, *Meteor.* 348a25 ff.; but supported by Epicurus in *Aët.* III.4.5 = *DG* 371.20 ff.; Seneca *NQ* IVB.3.5); (2) they are round because the element water has a rounded nature; i.e. they started off as drops of water (probably Posidonius, F136 EK; Aristotle (?); Seneca *NQ* IVB.3.3-4); (3) coldness has hardened and drawn it together from all sides in an equal manner (cf. *Ep. Pyth.* 107). But did Theophrastus regard these three accounts as exclusively incompatible? I want to try to face up to this question by turning, not before time, to the sections in the fragment where we do have extended evidence, on earthquakes, and on thunder, lightning and thunderbolts.

At *NQ* VI.13.1 Seneca surprisingly classified Theophrastus with Aristotle as explaining earthquake movement by the Aristotelian exhalations (*evaporationes, ἀναθυμιάσεις*).² But the accounts in the two *Meteorologies* are entirely different. Aristotle (*Meteor.* II.7-8), while reviewing as usual other theories, settles for wind,

² Seneca's actual citations of Theophrastus by name in *NQ* are largely concentrated (7) in Bk. III on the subject of terrestrial waters, and are confined to particular curiosities: III.11.2; 11.4; 11.5; 16.5; 25.4; 25.7; 26.1. They may have come from *De aquis*, although III.26.1 with IV.2.16 may have come from a book on the inexhaustibly popular subject of the Nile. The only other reference, VII.28.3, like VI.13.1, couples Theophrastus with Aristotle, in this case predicting effect of comets in violent and continuous storms and earthquakes. There is no sign that Seneca had Theophrastus' *Meteorology* in front of him.

moving air, πνεῦμα, arising from the exhalations. This is why earthquakes come after wind in *Meteor*. Practically all our surviving post-Aristotelian theories apart from Epicurean, agree in that basic theory although with variation in detail: Posidonius (Frs. 12, 230 EK), *De mundo* (395b30 ff.), Arius Didymus (F13, *DG* 453), Seneca (*NQ* VI.16 ff., esp. 21), Pliny (*NH* 2.192), Heraclitus (*Allegoriae* 38.6), Ammianus Marcellinus (17.7.13), Lydus (*De Ostentis* 53-4). Theophrastus lists four causes without prejudice or assignment; simply four causes. And again they turn out to rest on the four elements: earth collapse, water, air and fire. Of course Aristotle in his doxography cited Anaxagoras for αἰθήρ (365a20 ff.), Democritus for water (365b1 ff.) and Anaximenes for earth crumbling (365b7 ff.), in order to criticise their hypotheses. Seneca in *NQ* VI.5 ff. is still at this critical doxographic game: Thales (and Democritus probably alluded to, although unnamed, cf. Aët. III.15.1 = *DG* 379) for water (VI.6); Anaxagoras for fire (VI.9); Anaximenes for earth (VI.10; cf. Aët. III.15.3 = *DG* 379); Archelaus, among others, for air (VI.12); Democritus and Epicurus for several of the elements (VI.20.1); and indeed, *alii in omnibus his* (VI.5.1). Seneca of course with the Stoics plumps for one cause: *spiritus* (VI.21). It is remarkable that all these doxographies have very early reference. Even Ammianus (17.7.12) in the fourth century A.D. is still citing Anaximander and Anaxagoras. But the Theophrastean fragment's list of four causes is not a critical doxographic review from which Theophrastus would argue for his own explanation. This is not only indicated by the absence of names, but proved by the classification which follows of different kinds of earthquake, which are said to occur from different causes. 'Shakers' are caused by earth collapse; 'leaners' and 'rebounders' are caused by air pressure. We can add to that from the account of the four causes, that water is said in the fragment to be a contributory cause of earth collapse, and fire imprisoned in the earth creates air pressure. So, what we are given is a classification of the different physical elemental factors which can and do produce earthquakes. This actually requires more than one, indeed all of the elements as cause.

This is totally un-Aristotelian, and indeed un-Posidonian, and so is the classification of kinds of movement of earthquake. Earthquake after all is movement. Aristotle basically distinguished two kinds of shock (368b23 ff.): horizontal, like a shudder (τρόμος), and vertical like a throb (σφυγμός) (so also Ar. Did. F13, *DG* 453, under Aristotle). Posidonius (F230 EK) according to Seneca (VI.21.2) had a similar division: *succussio*, jolt from underneath (up and down), i.e. vertical movement; and *inclinatio* (tilting) or horizontal pressure. This directional classification continues in earthquake accounts; *De mundo* (396a1 ff.), Heraclitus, Ammianus, Lydus all begin their more extended classifications with these two. The vertical shock crystallised into the technical terms βρασματίας (Posidonius, Heraclitus, Ammianus)/βράσσης (*De mundo*, Lydus) (possibly from Aristotle's ἀναβραπτομένων *Meteor*. 368b30), and the horizontal to κλιματίας (Posidonius, Heraclitus, Ammianus)/ἐπικλίντης (*De mundo*, Lydus). But not so Theophrastus. His division

300 Theophrastus

is between 'shakers', classified by earth collapse, and 'leaners' and 'rebounders', classified by air pressure. Now the extended doxographic reviews in Aristotle (*Meteor.* 365b7 ff.) and Seneca (*NQ* VI.10) firmly reject earth collapse as cause; it is cited positively only in Ep. *Pyth.* 105, and most prominently as a first and leading cause only in Lucretius VI.536 ff., where indeed it occurs as his first feature of earthquake description. But perhaps the discrepancy is not quite so straightforward, for Seneca *NQ* VI.22 interprets Posidonius' *succussio*, but through Asclepiodotus, as occurring through subterranean collapse. Nevertheless, that will not heal the contrast. Although Asclepiodotus was an *auditor Posidonii* (T41 EK), his Αἰτίαι Φυσικαί was certainly not a rehash of Posidonius (Kidd, *Pos.* II.31). It is possible that Asclepiodotus was influenced partly by Theophrastus (he also mentioned the part played by water in loosening earth for collapse), but Posidonius regarded πνεῦμα as the cause of earthquake (F12 EK) of whatever type, including collapse. The critical point is that the Aristotelian/Posidonian tradition *identified* the division of earthquake classification by vertical/horizontal shock, Theophrastus *identified* his division by earth collapse/air pressure, and this throws us back again necessarily to multiple causal description by element. It seems now impossible to ignore this feature, for it is endemic to the account. Of course different categories of earthquake classification exist (e.g. Kidd, *Pos.* II.817 ff.), such as by manner of quakes, or by effect of quakes. But I have been trying to compare like to like.

Posidonius' theory of thunder was clearly based on Aristotle's dry exhalation in clouds (Sen. *NQ* II.54; F135.1-6 EK); indeed so much so that mistaken editors foisted on to Posidonius the theory specifically assigned to Aristotle by Seneca *NQ* II.12, which is simply derived from *Meteor.* II.9. But Posidonius' account was distinctively individual and personal in his stress on rarefaction and consequent expansion of air seeking escape and emerging noisily; and particularly in his emphasis on friction created by a moving current of turbulent air bursting or flying through clouds (Kidd, *Pos.* II.507 f.). Again Theophrastus is not at all like either Aristotle or Posidonius. Once more he gives a variety of causes, seven for thunder, four for lightning, three for thunderbolts. Again I would argue that these are not alternatives or preliminary reviews, but varieties of common phenomena. This is shown by the characteristic method of identifying each type by an illustrative analogy familiar to us. It was noticed very early on that these related to types of noise. This is hardly surprising, because thunder *is* noise, a point already made in Aristotle (*Meteor.* 369b1 ff.), and repeated by Seneca (*NQ* II.8; II.27 ?Posidonius). So the seven causes of thunder are identified by seven types of noise: clap, grinding, rumbling, bursting sound, slapping noise, 'raspberry' (i.e. as of air escaping from a skin or balloon), hissing crackle. But if the sounds are different, the physical conditions or causes must be different, and so they *are* given differently. Some sort of sound variation was credited to Anaximander by Seneca (*NQ* II.18), and Aristotle (*Meteor.* 369b1 ff.) mentioned distinctions of sound, but to fit his theory of πνεῦμα hitting clouds, he supposed that the variations arose from the different

shapes or unevenness of the clouds.

The variety of causes of thunder being thus guaranteed by what is said, the classification of physical conditions or causes is fairly comprehensive within conventional parameters of Greek elemental meteorological hypotheses. They fall into three main sections:

- A Cloud noise:* with clouds (i) clashing (clap, as from hollowed hands), or (ii) rubbing against each other (grinding, as with millstones).
- B Wind noise:* wind inside a cloud, (i) swirling round (rumble, like wind in a hollow cavern), (ii) bursting it (bang, like bursting a bladder); wind outside a cloud (iii) splitting it (slapping, like wind slapping paper), (iv) rushing through a tunnelled cloud ('raspberry' sound, like blowing through a gut entrail).
- C Fire noise:* fire falling into a damp cloud (hissing crackle, like a red-hot iron doused in water in a smithy).

This is not at all like Aristotle. Even in the wind section (*B*), Aristotle's noise arises from wind hitting clouds, while the Theophrastean fragment has wind bursting or splitting clouds, or roaring through or inside them. Aristotle has no mention of cloud-banging (*A*), and dismisses fire theories (*C*) (370a24 ff.). Posidonius dismisses both *A* and *C* (F135.15-22 EK). Then while separate items from the Theophrastean catalogue recur elsewhere, the whole optimistically comprehensive range never does, except inevitably in Lucretius VI (with close parallels including the illustrative analogies), and to a lesser extent in Ep. *Pyth*.

The provenance of the different sections is confusing chronologically. One of the early disputes apparently was whether fire is already in or introduced to the clouds, or did not exist before (or only potentially so), but was produced or engendered for the occasion (Arist. *Meteor.* 370a25: still in Sen. *NQ* II.12). So fire *C*-class theories are early: Empedocles (DK 31A62; Aët. III.3.7) and Anaxagoras (DK59A42.11, 84; Sen. *NQ* II.12.3, 19; Aët. III.3.4); Anaximenes (Sen. *NQ* II.17); Diogenes (Aët. III.3.8); Archelaus (Aët. III.3.5). These were dismissed by Aristotle (*Meteor.* 369b12 ff., 370a24), Posidonius (F135.19 ff. EK), and Seneca (*NQ* II.13 f.). But Ep. *Pyth.* 100 preserves the theory, and Lucretius VI.145 ff. the details.

On the other hand *A*, the cloud-banging section, although an early 'popular' view (Ar. *Clouds*, 383), was taken up professionally by the Stoics (D.L. VII.153; Aët. III.3.12; Chrysippus, Aët. III.3.13), and even by Asclepiodotus (Sen. *NQ* II.30), but rejected by Posidonius (F135.15-18 EK). There seems no other surviving support apart from Ep. *Pyth.* 100 and Lucretius VI.96 ff., 116 ff. It does not appear to surface in the later Aristotelian tradition. It is worth noting that since the original classification was one of sound, Theophrastus has to defend the theory of 'soft' clouds 'banging', an argument still going on in Seneca *NQ* II.28, perhaps through Posidonius, who attacked it. If Theophrastus had to defend it, does that suggest that he took over an earlier theory? *Clouds* might suggest this too, but D.L. II.9 on Anaxagoras goes against all the other evidence.

The variations of the wind section *B* stretch further, but are vague: *r* cloud bursting and (possibly) splitting for Anaximander (Sen. *NQ* II.18; Aët. III.3.1; cf. Ar. *Clouds* 404 ff.), and splitting possibly for Metrodorus (Aët. III.3.3); bursting, splitting and blowing through clouds in Posidonius (F135.10 f. EK); bursting for Pliny (*NH* 2.113) and for 'some Stoics' in Sen. *NQ* II.15 (*SVF* II.703-5); internal swirling and rumbling and bursting in *De mundo* 395a12 ff.; and of course recorded in Ep. *Pyth.* 100 and thickly larded in Lucretius (VI.121 ff.).

Theories of lightning derive from theories of thunder, and so in the fragment too, the four causes derive from clouds striking or rubbing, or from the action of fire imprisoned in clouds, that is, thunder sections A and C. This could hardly be more different from Aristotle, 369b5 ff. The Aristotelian key factor of πνεῦμα (or the *B* section) is ignored; while Aristotle (369b12 ff.) and later Seneca (*NQ* II.13-14) criticised the fire theories. But in addition to Ep. *Pyth.* 101 and Lucretius (VI.160 ff.), the early Stoics, Zeno and Chrysippus (D.L. VII.153; Aët. III.3.13), and probably Asclepiodotus adopted cloud banging and friction for lightning. Posidonius followed Aristotle again with a theory of moving air friction (F135 EK), and so did subsequent tradition like *De mundo* (395a15 f.; cf. Arrian, Stob. I.235.19).

Of the usual thunder/lightning ἀπορίαι, the most interesting is why lightning is seen before thunder is heard. The fragment *more suo* gives two explanations. The implications of the Syriac are slightly unclear here, but may perhaps be clarified by Ep. *Pyth.* 102. The two views are: (a) lightning is very fast in emerging from the cloud, and so actually precedes thunder; and (b) lightning and thunder are simultaneous, but we *see* lightning more quickly than we *hear* thunder. Most people think that Theophrastus could not have entertained (a), but only presented it as an earlier view. For Aristotle (369b17 ff.) had attacked Empedocles and Anaxagoras for this view of the actual prior occurrence of lightning. But such an attitude is adopted because we know that Aristotle was right, that light travels faster than sound, as Pliny (*NH* 2.142) for once correctly put it. But the ancients could do no more than give the usual illustrative instances (incidentally Theophrastus' illustration of a woodcutter, adopted as usual by Lucretius (VI.167 ff.), is different from Aristotle's one of rowing a trireme (369b10 ff.)). Ep. *Pyth.* happily gives both (a) and (b). (b) itself alters Aristotle, who thought that lightning occurred after thunder (followed by *De mundo* 395a17 ff., and Arrian, Stob. I.235.20 ff.). The Theophrastean suggestion of simultaneity was followed by the Stoics (Chrysippus, Aët. III.3.13), Seneca (*NQ* II.12.1) and Pliny (*NH* 2.142). We do not know Posidonius' view here.

Again in thunderbolts the Theophrastean fragments are quite different from Aristotle, but Theophrastus' concise definition of fiery wind or windy fire became commonplace. But the disquisition on what kind of fire it is is more unusual, and writers like *De mundo* 395a26, Arrian, Stob. I.237 and Seneca, *NQ* II.4 are closer to Aristotle than to Theophrastus. Also the Theophrastean list of causes of thunderbolts is not at all like the Aëtius collection (III.3), for example, but they are repeated in Lucretius (VI.175 ff., 246 ff., 277 ff.) as usual, through whom I

suppose the illustrative analogy of the fired catapult ball entered Latin poetry in Vergil (*Aen.* 9.588), Ovid (*Met.* 2.728; 14.825) and Lucan (7.513). Of the unusual number for the fragment of four surviving ἀπορίαι, two chestnuts (why thunderbolts although fiery move downwards, and why they pass through some material without harming it to destroy others) are already in Aristotle *Meteor.* but with different illustrations (369a12 ff.; 371a26 ff.); but two (seasonal occurrence, and frequency in hills) may have originated with Theophrastus, and recur in later debate (e.g. Sen. *NQ* II.57.3, 58.3; Pliny *NH* 2.135 f.; Arrian, *Stob.* I.238.5).

There is one interesting oddity of order. In general meteorological tradition, thunderbolts always go with thunder and lightning, except in Aristotle, who because of his πνεῦμα theory, groups them later in Bk. III with excessive winds. On the other hand, πρηστήρ, which seems to vary between fire wind, hurricane, tornado and waterspout, usually in order comes immediately after thunderbolts (e.g. Ep. *Pyth.* 104; Lucretius VI.423 ff.; Aëtius III.3; *Stob. Ecl.* I.29; *De mundo* 394a18). And in Theophr. *De igne* 1, οἱ πρηστήρες καὶ κεραυνοὶ are mentioned together. But not in the Theophrastean fragment, where it is presented quite separately much later, after cloud, rain, snow, hail, dew, frost and ice, under wind. And this position is guaranteed because πρηστήρ illustrates for Theophrastus by his analogy of pipe suction how some winds arise through *horror vacui*. Gottschalk (*Gnom.* 37 (1965), 759 f.) claimed that *horror vacui* was not recognised before Strato, and that therefore this passage must be a later insertion than Theophrastus, and so our fragment is a later collective piece. I am unconvinced by this particular argument. For one thing, the pipe suction illustration is as early as Hipp. *VM* ch. 22.

The fragment, or epitome, if it is so, seems to me very unlike Aristotle's *Meteorology*. It presents theories which Aristotle had criticised and rejected; it presents others which are incompatible with Aristotle's conclusions, hypotheses and arguments. It seems different not only in content, but also in presentation and form. This difference has been countered or blunted by claiming that the fragment with its lists of multiple causes derives from an epitome which has by abbreviation blurred the usual organisation of doxographic review, dialectical process and conclusion. I have been trying to suggest that this claim does not fit the evidence.

We should distinguish different attitudes to multiplicity of causal explanation in Greek philosophy:

- (i) The review of earlier theories is grist for the formation of one's own solution; i.e. one uses them, but does not adopt them (so Aristotle).
- (ii) They are simply collected as δόξαι for academic, scholastic or rhetorical purposes, and as such and name-tagged become part of the doxographical tradition.
- (iii) Different multiple theories are given as all *possible* solutions, and we have no way of deciding between them. There are two opposite conclusions to this: (a) therefore they are all equally right (Epicurus), or (b) therefore they are all equally unknown and untenable, so we must

reject the lot (Sceptics).

- (iv) Scientists can give alternative explanations of phenomena, which appear to work equally well within the parameters and limitations of physical science as far as one can observe and test them (e.g. both the eccentric circles of Apollonius of Perge, and the epicycles of Hipparchus save the phenomena). However, there is one correct explanation, but the scientist cannot decide on it, but only the natural philosopher who is finally equipped to understand and supply it (this is Posidonius F18 EK, Kidd, *Pos.* 129 ff.).
- (v) Phenomena *are* manifold; similar phenomena actually arise in different ways. So multiple causes are a genuinely attempted classification of the variety of production of natural phenomena.

I argued that the Theophrastean fragment's presentation of thunder and earthquakes can only be explained in this way. And I suggest that it is this category (v) that typifies the fragment, although (v) is allied also to (iii), the numeration of *possible* causes, which is no doubt why Theophrastus appealed so much to the Epicureans. But I suspect that at times Theophrastus himself may not have clearly distinguished between (v) and (iii).

If all this is so, this is not so much cause in the sense of explanation by positing a hypothesis or postulates which explain phenomena as deriving from them, as Aristotle's positing of the two exhalations from which he derived all meteorological phenomena. Theophrastus' method seems rather a classification by catalogue, a kind of taxonomy proceeding from the phenomena to their classification under which you can group or subsume any instance which occurs. I was struck by the plurals in the first sentence of Theophrastus, *De ventis* in comparison with the singulars of the parallel passage on nature and cause of wind in Aristotle, *Meteor.* 349a32 ff. Here is Theophrastus: ἡ τῶν ἀνέμων φύσις, ἐκ τίνων μὲν καὶ πῶς καὶ διὰ τίνος αἰτίας γίνεται, τεθεώρηται πρότερον; and Aristotle: τί τ' ἐστὶν ὁ ἄνεμος, καὶ γίνεται πῶς, καὶ τί τὸ κινεῖν, καὶ ἡ ἀρχὴ πόθεν αὐτῶν ... And compare Theophrastus, *De igne* 2 of fire, ὅτι πλείστας ἔχει γενέσεις.

With regard to content and transmission, it is clear that the Theophrastean meteorology made a hit with Epicurus and the Epicureans, and I submit that we can now see why. But also it, rather than Aristotle, seems to have had some impact on the early Stoa. Things appear to have changed in the first century B.C., apart from the copious reproductions of Lucretius. Posidonius certainly went back to Aristotle, and from then on it seems to me that the Stoic and Peripatetic tradition was Aristotelian not Theophrastean.

APPENDIX

On the Order of Presentation of Meteorological Phenomena

The Theophrastean fragment:

Thunder, lightning, thunderbolts; clouds, rain, snow, hail (vaporous condensation in upper atmosphere), dew frost, [ice (Bar Bahlül, Arabic § 43 Bergsträsser)] (condensation on lower earth surface); wind, *prester*; halo; earthquakes.

Aristotle, *Meteor.*:

Upper atmosphere, dry hot exhalation: shooting stars, Aurora Borealis, comets, Milky Way (I.4-8); lower atmosphere, vaporous exhalation: rain, cloud, mist, dew, hoar-frost, snow, hail (I.9-12); rivers, springs, climatic changes, coastal erosion and silting; the sea (origin, place, saltness) (I.13-II.3); dry exhalation: wind, earthquakes, thunder and lightning, hurricanes, typhoons, *prester*, thunderbolts (II.4-III.1); phenomena of reflection: halo, rainbow, rods and mock suns (III.2-6).

Epicurus, Ep. *Pyth.* (D.L. X.99-114):

(Sun, moon, eclipses, nights and days, weather signs), clouds, rain, thunder, lightning, thunderbolts, *prester*, earthquakes, wind, hail, snow, dew, frost, ice, rainbow, halo, comets, falling stars.

Lucretius VI.50 ff.:

(Superstition and true causes, 50-95); thunder (96-159), lightning (160-203), thunderbolts (204-422), *prester* (423-450); clouds (451-494), rain (495-526); snow, winds, hail, frost, ice (527-534); earthquakes (535-607); seas (608-638); volcanoes (639-702); Nile (712-737); Avernian lakes (738-839); wells and temperature (840-878); spring catching fire (879-905); the magnet (906 ff.).

Seneca, *NQ*:

The order as we have it, was probably not the original one: halo, rainbow, rods, *parhelia* etc. (I); thunder and lightning (II); rivers (III); the Nile (IVA); hail, snow (IVB); wind (V); earthquakes (VI); comets (VII).

The original order has been argued as (v. Hine, *An Edition with Commentary of Seneca NQ* 2, p. 29): (I) rivers; (II) The Nile; (III) <clouds, rain> snow, hail; (IV) winds; (V) earthquakes; (VI) comets; (VII) meteor, rainbow, halo etc.; (VIII) thunder and lightning.

De mundo, 4:

A The two Aristotelian exhalations: (1) from the moist: mist, dew, frost, cloud, rain, snow, hail; (2) from the dry: wind, thunder, lightning, thunderbolts, *prester*.

B Phenomena in the atmosphere either (1) optical (κατ' ἔμφασιν): rainbow, rods or streaks, halo; or (2) substantial (καθ' ὑπόστασιν): masses of kindled fire, shooting stars, comets etc.

C Phenomena on earth of fire, wind or water: volcanoes, geysers and hot springs (fire); wind, earthquakes (wind); sea phenomena (sea-bed changes, currents, tides etc.).

Aëtius (Ps.-Plut. *Plac.* III.1 ff.; Stob. *Ecl.* I.27 ff. = DG 364 ff.):

Milky Way; comets and like phenomena; thunder, lightning, thunderbolts, *prester*, typhoon; clouds, mist, rain, dew, snow, frost, hail (so Ps.-Plut; this comes after rainbow etc. in Stobaeus); rainbow, *rhabdoi* (Stob. adds halo, parhelion); winds.

Stobaeus then continues: earthquakes; waters.

Ps.-Plut. continues: earth; earthquakes; sea and tides; halo; Nile. Precisely the same order as Ps.-Plut. *Plac.* is found in Ps.-Galen, *Hist. Phil.* 74-89 (DG 629-634).

Stoic meteorology in D.L. VII.151-154:

Seasons, wind, rainbow, comets, bearded stars, meteors, shooting stars, rain, frost, hail, snow, lightning, thunder, typhoon, *prester*, earthquakes.

The Authorship and Sources of the *Peri sēmeiōn* Ascribed to Theophrastus

Patrick Cronin

I. INTRODUCTION

The *Περὶ σημείων* (abbreviated hereafter to ΠΣ) is entitled in the MSS *περὶ σημείων ὑδάτων καὶ πνευμάτων καὶ χειμώνων καὶ εὐδιῶν*.¹ It begins with a brief introduction (sections 1-9) which may be summarised as follows:

Section 1. The author states his subject and acknowledges his debt to sources.

Section 2. The varieties of astral risings and settings are set forth.

Section 3. Some signs are peculiar to mountainous areas and can best be learned from a local expert.

Section 4. Some astronomers have used the physical features of their own localities for their observations.

Section 5. Other signs are derived from animals, from domestic phenomena, and from the sun and moon. Why the interlunar period (αἱ σύνοδοι τῶν μηνῶν) is stormy.

Sections 6-9. The various periods (*i.e.* year, month, day) are all approximately divided in half; the weather prophet must take account of this, for the weather tends to change at the divisions.

Four chapters follow in which the author sets out signs of rain (I = 10-25), wind (II = 26-37: 35-7 give a description of the winds), storm (III = 38-49), and fine weather (IV = 50-4). The theme of each of the four chapters is not rigidly adhered to, but intrusions frequently occur; thus, for example, a sign of wind may appear in chapter I or a sign of rain in chapter II. Finally there are three sections (55-

¹ The texts I have used are: J. G. Schneider, *Theophrasti opera*, Leipzig, 1818-22; F. Wimmer, *Theophrasti Eresii opera, quae supersunt, omnia*, Paris, 1866; A. Hort, *Theophrastus: Enquiry into Plants* (Loeb), London and New York, 1916, II, pp. 390-443 (= *Concerning Weather Signs*). The abbreviations are mainly those of *The Oxford Classical Dictionary*. I wish to thank Prof. G. L. Huxley and Prof. J. A. Richmond for reading the first draft of this article and for offering helpful comments.

7) which serve as an appendix: in 55 we are told that the flowering of the σχῖνος indicates the season for sowing; in 56 we find signs which are relevant to the whole year or to whole periods of it (σημεῖα ὅλων τε τῶν ἐνιαυτῶν . . . καὶ τῶν μορίων) and in 57 signs of various kinds of weather.

The work would seem to be intended as a practical weather-guide for the general reader, especially farmers and sailors. It is devoid of literary charm, being characterised by much monotonous repetition (e.g. 11, where the combination καὶ ἔαν occurs six times). Nowhere does the author state his name or the title or titles of other literature on his subject. ΠΣ cannot antedate 432 B.C. for it refers (4) to the 19-Year Cycle of Meton which was introduced in that year. All the MSS either specifically state, or else imply that Aristotle was the author of ΠΣ. In them it is usually attached to the fragment entitled ἀνέμων θέσεις καὶ προσηγορίαι· ἐκ τῶν Ἀριστοτέλους περὶ σημείων. Simon Gryneus, Professor at the University of Tübingen (1534-6), was the first to attribute it to Theophrastus, but it is not known on what grounds he did so.² It has been included among the works of Theophrastus since the publication of the *Editio Basiliensis* (1541). In the preface to that edition Ioachim Camerarius, in setting forth the contents, wrote: *Sequuntur de ventis libri singuli. Item de aquarum et ventorum signis liber unus, quem priores incerti auctoris inscripserunt.*

Ancient Testimonia

The following are the ancient testimonia for the attribution to Aristotle and Theophrastus of a work on weather signs.

Aristotle

- i. Geminus (*Isagoge*, 17.49, ed. Manitius) says that Aristotle and Eudoxus treated of weather signs derived from the sun, moon, shooting stars and animals, as Aratus did: τούτοις δὲ τοῖς σημείοις καὶ Ἀριστοτέλης ὁ φιλόσοφος κέχρηται καὶ Εὐδοξος Any one of four conclusions may be drawn from this statement: Geminus is referring to (a) ΠΣ, where all four categories of predictive media are found, in the belief that it was Aristotle's work, or (b) weather signs which are mentioned incidentally in other works of Aristotle (e.g. *Mete.* 361b30-3 [Orion], 372b20-2 [haloes round sun or moon], 377b23-7 [mock suns]; *Hist. An.* 575b17-19 [cows], 614b20-1 [cranes], 627b10-13 [bees])—the absence of any such incidental sign derived from shooting stars weakens but hardly invalidates this

² W. Kley, *Theophrasts Metaphysisches Bruchstück und die Schrift περὶ σημείων in der lateinischen Übersetzung des Bartholomaeus von Messina*, Diss., Berlin, 1936, p. 29; V. Rose, *Aristoteles Pseudepigraphus*, Leipzig, 1863, pp. 243-4.

conclusion, for in the case of shooting stars Geminus may have had only Eudoxus in mind—or (c) a separate compilation of weather signs by Aristotle, which is now lost, or (d) a separate work on weather signs which he wrongly ascribed to Aristotle.

- ii. Seneca (*Q.Nat.* 7.28.2) tells us that Aristotle held comets to be a sign of storm, violent wind and heavy rain:

Aristoteles ait cometas significare tempestatem et ventorum intemperantiam atque imbrium.

The view ascribed to Aristotle here is at obvious variance with what he himself tells us about comets (*Mete.* 344b19-20):

σημαίνουσι γινόμενοι πλείους πνεύματα καὶ ἀνέμους

Since in ΠΣ comets are taken as a sign of wind and drought (34) and cold weather (58), not rain, we cannot explain Seneca's words by the assumption that he regarded Aristotle as the author of that work. It may be that Aristotle in a work now lost and concerned partly or entirely with weather signs expressed the opinion about comets ascribed to him by Seneca, or else that Seneca is incorrectly recalling the words in *Meteorology* already quoted.

- iii. Aelian (*NA.* 7.7) introduces a section dealing with weather signs drawn from birds in these words:

Ἀριστοτέλους ἀκούω λέγοντος ὅτι

He then goes on to present several weather signs which do not occur in ΠΣ, so that this work is unlikely to have been that which he held to be Aristotelian, and since they do not occur in any extant work of Aristotle, the possibility arises that Aelian is referring to a lost work in which Aristotle dealt at least with ornithological weather signs.³

- iv. Diogenes Laertius (5.26) attributes to Aristotle a work entitled *Σημεῖα χειμώνων* α'. Diogenes' list of Aristotle's works derives ultimately (through, for example, Panaetius, Sotion and Thrasyllus) from Hellenistic library catalogues and is therefore worthy of some credence.
- v. Hesychius of Miletus attributes to Aristotle (p.14.99 Rose³) a work *Σημασί-ας χειμώνων* α'.
- vi. Ioannes Lydus (*De Ost.* 2. 6A ed. Wachsmuth) refers vaguely to Aristotle's treatment of weather signs:

τὰ γὰρ Ἀριστοτέλει εἰρημένα γνωριμώτατα

This statement invites the same conclusions as does that of Geminus: (i) *supra*.

- vii. In a scholium (MA) on Aratus, *Phaen.* 1095 we read:

³ There is of course the possibility that Aelian is quoting at second hand as he often does. A. F. Scholfield, *Aelian On the Characteristics of Animals* (Loeb), London and Cambridge, Mass., 1959, II, p. 103, is mistaken in stating that this passage of Aelian is based on ΠΣ.

ἐκ νήσων ὅτε πολλαί: Ἀριστοτέλης φησὶν “ὅταν μὲν ὑγρὸς ἦ καὶ ψυχρὸς ὁ ἀήρ, τὸ τηνικαῦτα καὶ αἱ νῆσοι βρεχόμεναι ἀναφύουσιν, καὶ τὰ ἐν αὐταῖς ὄρνεα τρέφουσιν. ὅταν δὲ αὐχμώδης ἦ καὶ ξηρὸς, τότε παντελῶς τῶν νήσων μὴ ἀναφυσουσὼν ἐπὶ τὴν γῆν τὰ ἐν ταῖς νήσοις ὄρνεα φεύγουσιν, εἰς ἣν δύνανται κἂν ἐξ ὀλίγου τρέφεσθαι”. καὶ οἱ κολιοὶ δὲ ἐκ τῶν νήσων πετόμενοι τοῖς γεωργοῖς σημεῖον αὐχμοῦ καὶ ἀφορίας, ἐὰν δὲ ἔμμετροι χωρῶσιν, εὐκαρπίαν δηλοῦσιν.

The words of Aristotle (fr. 240 Rose³) quoted here are not found in ΠΣ or in any extant work of Aristotle. The lost source posited for Aelian (NA. 7.7: cf. iii *supra*) may also have been used by the scholiast.

Theophrastus

- i. Diogenes Laertius (5.45) attributes to Theophrastus a work entitled Π. σημείων, which surely had weather signs as its theme.
- ii. Proclus (*In Plat. Tim.* 4. 285-86a, ed. E. Diehl) writes:

θαυμασιωτάτην δὲ εἶναι φησὶν ὁ Θεόφραστος ἐν τοῖς κατ' αὐτὸν χρόνοις τὴν τῶν Χαλδαίων θεωρίαν, τὰ τε ἄλλα προλέγουσαν καὶ τοὺς βίους ἐκάστων καὶ τοὺς θανάτους, καὶ οὐ τὰ κοινὰ μόνον, οἷον χειμῶνας καὶ εὐδίας, ὥσπερ καὶ τὸν ἀστέρα τοῦ Ἑρμοῦ χειμῶνος μὲν ἐκφανῇ γενόμενον ψύχη σημαίνειν, καύματα δὲ θέρους εἰς ἐκείνους ἀναπέμπει· πάντα δ' οὖν αὐτοὺς καὶ τὰ ἴδια καὶ τὰ κοινὰ προγιγνώσκειν ἀπὸ τῶν οὐρανίων ἐν τῇ Περὶ Σημείων βίβλῳ φησὶν ἐκεῖνος.

The weather maxim concerning the planet Mercury is expressed in almost identical language in ΠΣ (46) but it is not there attributed to the Chaldeans. Clearly the work of Theophrastus to which Proclus refers was much wider in scope than ΠΣ, not being confined to weather signs (τὰ κοινά).⁴

Conclusions of Modern Scholarship

Throughout the nineteenth and twentieth centuries research devoted to ΠΣ has been based largely on the assumption that it is not an original work but a collection of excerpts. As a result, scholars have been primarily concerned with an investigation

⁴ E. Usener, *Epicurea*, Leipzig, 1887, p. XL, conjectured that the statement concerning the Chaldeans, which Proclus attributes to Theophrastus, comes not from a work on weather lore but from one on inductive inference; cf. E. Pfeiffer, “Studien zum antiken Sternglauben”, *ΣΤΟΙΧΕΙΑ*, Leipzig, 1916, II, p. 49. Some weather signs occur in the *De Ventis* of Theophrastus (35, 46) and it may be assumed that weather signs found some place in the following lost works of his: *Μεταρσιολεσχίας α'*, *Μεταρσιολογικῶν α'β'*, *Περὶ Μετεώρων* (Diog. Laert. 5.43-5), *Περὶ Μεταρσίων* (Plut. *Quaest. Graec.* 7: identified with *Μεταρσιολογικῶν α'β'* by W. R. Halliday, *The Greek Questions of Plutarch* Oxford, 1929, p. 54).

of possible sources.⁵ Only Bergk and Kaibel argued that ΠΣ is an independent work, of unknown authorship, though the latter claimed to recognise debts to Aristotle, Aratus and a lost Grundschrift. All the other scholars who have studied ΠΣ have seen it as an anonymous collection of excerpts either from one source (Schneider, Boehme, Heeger) or from two sources (Rose, Maass) or from a multiplicity of sources (Gillespie, Rehm, Arrighetti). The author most consistently mentioned as a source is Theophrastus. The possible influence of Aristotle (Maass, Kaibel) has been seen mainly in the passage describing the winds (35-7), that of Euctemon (Rehm) in (a) the use of certain weather-predictive mountains (e.g. Hymettus: 20), (b) the system of year-division (6-9) and the belief that fixed dates have a special meteorological significance (23).

Boehme's array of arguments for Eudoxus as a chief source was substantially refuted by Heeger. That Bergk and Maass were misguided in their reliance on Ionic elements—the former dating the work to the late fifth century, the latter arguing for Democritus as a chief source—was clearly demonstrated by Kaibel. One cannot justify the conclusion (Rose, Kaibel) that similarities in language and arrangement of subject matter between ΠΣ and Aratus bespeak a debt of the former to the latter. Similarities there are, but since the alleged borrowings do not differ in style from the rest of ΠΣ, one could equally well argue, as Schneider did, that it was Aratus who borrowed from ΠΣ. Arrighetti goes too far in his admiration of ΠΣ as "frutto di pura erudizione" (p. 436), the work of an Alexandrian scholar trying to manipulate a multiplicity of sources; nevertheless he was successful in his attempt to acquit the author of ΠΣ of a charge of deliberately concealing the identity of his source, which Heeger had rather perversely levelled against him.⁶ Boehme and Maass claimed to detect the presence in the text of supplementary material derived from the personal observation of the author, while Arrighetti saw popular weather lore

⁵ The following is a list of writings on ΠΣ which I have consulted and which I believe to be comprehensive: J. G. Schneider, *Theophrasti Opera*, Leipzig, 1818, IV, pp. 719-20; V. Rose, *Aristoteles Pseudepigraphus*, Leipzig, 1863, pp. 243-54; J. Boehme, *De Theophrasteis quae feruntur perī sēmeiōn Excerptis*, Diss., Hamburg, 1884; T. Bergk, *Griechische Literaturgeschichte*, Leipzig, 1887, IV, pp. 502-4; M. Heeger, *De Theophrasti qui fertur perī sēmeiōn libro*, Diss., Leipzig, 1889; E. Maass, *Göttingische gelehrte Anzeigen*, Nr. 16, 1893, pp. 624-42; G. Kaibel, "Aratea" *Hermes* 29, 1894, pp. 102-20; C. Wessely, "Bruchstücke einer antiken Schrift über Wetterzeichen", *Sitzungsberichte der kaiserlichen Akademie der Wissenschaften, Phil.-hist. Klasse*, Wien, 1900, CXLI, Abh. I, pp. 38-41, A. Rehm, *Berliner Philologische Wochenschrift*, No. 17, 1902, 514-16; W. E. Gillespie, *Virgil, Aratus and others*, Diss., Princeton, 1937, pp. 22-31; O. Regenbogen, *RE*, S. 7 (1940), col. 4112-15, s.v. "Theophrastos"; A. Rehm, "Parapegmastudien", *Abhandlungen der bayerischen Akademie der Wissenschaften, Phil.-hist. Abteilung*, neue Folge, 19, 1941, Anhang, pp. 122-40; R. Böker, *RE*, S. 9, 1962, col. 1609-92, s.v. "Wetterzeichen"; G. Arrighetti, "Problemi di letteratura meteorologica greca, *Maia* 15, 1963, pp. 399-41.

⁶ In his zeal to prove the carefulness which he claims for the author of ΠΣ Arrighetti fails to see the illogicality of the following sentence: ἐὰν δὲ νότιων ὄντων ψοφή τι τῶν κεκολλημένων, εἰς τὰ νότια σημαίνει τὴν μεταβολήν (30). Surely Furlanus' conjectured βόρεια (for νότια) must be accepted here.

312 Theophrastus

as the source of such material. Bergk's identification of the author of ΠΣ as a Thasian, resting as it does on the very insecure ground that Archilochus alone of Greek poets is quoted (45), should be dismissed as wild conjecture.

Despite considerable scholarly investigation, mystery still surrounds the authorship, date and method of composition of ΠΣ. In the remainder of this paper an attempt is made to offer a new solution.

II. A NEW SOLUTION

At the outset it is necessary to state two fundamental points which have not received the recognition they deserve. Firstly, one must not expect literary quality from a prose collection of weather signs: one is not justified, therefore, in rejecting the possibility of Aristotelian or Theophrastean authorship for ΠΣ simply on the basis of its *genus dicendi incultum* (Heeger). Secondly, ΠΣ, being essentially a disjointed catalogue, is particularly vulnerable to interpolation; it must, therefore, be approached with editorial scepticism and a willingness to prune drastically. Furthermore, the many similarities both in content and language between ΠΣ and passages in the extant works of Aristotle (e.g. *Mete.* 372b20-2: ΠΣ 51) and Theophrastus (e.g. *De Vent.* 58: ΠΣ 30) lead one to place the work firmly in the Peripatetic tradition. The ancient testimonia, already set forth, provide substantial evidence of the interest of Aristotle and Theophrastus in weather signs and render credible the possibility that each wrote a work on the subject. The Peripatetic character of ΠΣ is, of course, no guarantee of Aristotelian or Theophrastean authorship and may merely qualify it for admission to the number of anonymous monographs produced in the Lyceum, especially at the end of the fourth century.

A priori, therefore, three hypotheses as to the authorship of ΠΣ, may be advanced: it is the work of (a) Aristotle or (b) Theophrastus or (c) an unknown student of the Lyceum who shared the interest of its early masters in popular meteorology. These hypotheses will be tested through an analysis of the text. Moreover, since (a) ΠΣ has some affinity with the paraepgmata or seasonal calendars, (b) a scholium on *Phaenomena* 752 states that Aratus owed some debt to these for his celestial weather signs and (c) earlier investigators of ΠΣ have claimed to detect in it the influence of the paraepgmata Democritus (Maass), Euctemon (Rehm) and Eudoxus (Boehme), it is fitting that this analysis should extend to the calendar attached to Geminus' *Isagoge* (pp. 211-33, ed. Manitius, hereafter abbreviated [Gem.] *Cal.*), which used as sources Democritus, Euctemon, Meton, Eudoxus, Callippus and Dositheus. In this way we may be able to establish whether or not the author of ΠΣ was indebted to the paraepgmata.⁷

⁷ The paraepgma (its name derived from παρατήγνυμι) made its appearance early in the second half of the fifth century B.C. (Democritus is the earliest authority cited in [Gem.] *Cal.*; also *Fr.* B 13 (D-K) mentions a work παράπηγμα). It was a kind of almanac engraved on stone and giving astronomical and meteorological phenomena for all the days of the year. It owes its

The Introduction: Sections 1-9

Section 1

Σημεῖα ὑδάτων καὶ πνευμάτων καὶ χειμώνων καὶ εὐδιῶν ὧδε ἐγράψαμεν καθ' ὅσον ἦν ἐφικτόν, ἃ μὲν αὐτοὶ προσκοπήσαντες ἃ δὲ παρ' ἐτέρων οὐκ ἀδοκίμων λαβόντες.

The author unequivocally lays claim to some input based on personal observation and acknowledges his debt to "persons worthy of credit". The omission of his name is in keeping with Peripatetic practice. καθ' ὅσον ἦν ἐφικτόν: For similar usage cf. Lys. *In Eratosth.* 94, καθ' ὅσον δύνασθε, *In Phil.* 8. καθ' ὅσον ἀναγκάζομαι, Plat. *Tim.* 51b, καθ' ὅσον δὲ ἐκ τῶν προειρημένων δυνατόν.

ἃ μὲν . . . ἃ δὲ . . . : Standard Attic requires τὰ μὲν . . . τὰ δὲ . . . but Philemon, fr. 99 (Kock), ὧν μὲν διὰ τύχην, ὧν δὲ δι' ἑαυτοὺς ἐσόμεθ' ἐστερημένοι, suggests that the usage with the relative may have been current in the late fourth century B.C..

Τὰ μὲν οὖν ἐπὶ τοῖς ἄστροις δυομένοις καὶ ἀνατέλλουσιν ἐκ τῶν ἀστρονομικῶν δεῖ λαμβάνειν.

Similarly Aristotle in *Cael.* 291a29-32 directs the reader to astronomical writings (ἐκ τῶν περὶ ἀστρολογίαν θεωρείσθω) for matters which he considered to be outside the scope of that work. Signs derived from astral risings and settings belong especially to the *parapegmata*. As the *parapegmata* based their predictions on calculated probability and therefore might lay some claim to scientific status, being the work of men who were primarily astronomers, the author of ΠΣ might reasonably wish at the outset to distinguish them expressly from his own work, which is concerned with the folklore of weather, and so to direct his reader either to a specific *parapegma* or to *parapegmata* in general for information which he himself will not provide.⁸ The weather lore which he takes as his theme was the fruit of centuries

name to the fact that a movable peg was each day inserted into a hole beside that part of the text which contained the information for that particular day. Fragments of stone *parapegmata* have been found in Miletus (H. Diels and A. Rehm, "Paraepmenfragmente aus Milet", *Sitzungsberichte der preussischen Akademie der Wissenschaften*, Berlin, 1904, pp. 92 and 752; A. Rehm, *op. cit.* pp. 5 ff. and *RE* 18(4), 1949, col. 1299-1301, s.v. "Parapegma") and Athens (A. Brueckner, *Mitteilungen des deutschen archäologischen Instituts, Athenische Abteilung*, 1931, 56, pp. 23-4). The same data were also entrusted to conventional calendaric texts, of which the two most important examples are [Gem.] *Cal.* and Ptolemy's *Phaseis*; for other examples cf. *Sitzungsberichte der heidelberger Akademie der Wissenschaften, phil.-hist. Klasse*, I, 1910; II, 1911; IIIA, 1913. Manitius dates [Gem.] *Cal.* to c. 170 B.C., i.e. about one hundred years earlier than the main text. For the scholium to *Phaen.* 752 cf. *Scholia in Aratum Vetera* (ed. J. Martin), Stuttgart, 1974, p. 381. I take the words ἐκ τῶν πινάκων in this scholium as a reference to *parapegmata*.

⁸ Other possible but less likely meanings of ἐκ τῶν ἀστρονομικῶν are "from works on astronomy" and "from astronomy" (cf. Wimmer's *ex astronomia*).

of observation of the natural environment in its varied aspects (e.g. celestial, zoological, domestic) by Greek countrymen and sailors. It was already ancient in the time of Hesiod who in the *Opera* shows himself familiar with it (e.g. 564-7, 597-9, 614-17). Transmitted orally over the centuries it was eventually committed to writing in a systematic way probably for the first time by the Peripatetics. The author of ΠΣ sees himself as following in the footsteps of Hesiod rather than in those of Democritus or his fellow paraepigrammatists. In fact in the whole of the work, though numerous signs of weather are derived from celestial phenomena (e.g. sun, moon, clouds, shooting stars), there is but one which, being derived from astral risings (i.e. the heliacal risings of Sirius and Arcturus), bears any resemblance to the data of the paraepigrammata: ἐὰν μὴ ἐπὶ Κυνὶ ὕσῃ ἢ ἐπὶ Ἀρκτοῦρῳ ὥς ἐπὶ τὸ πολὺ πρὸς ἰσημερίαν ὕδωρ ἢ ἄνεμος (23).

Boehme assumed that a paraepigramma was attached to ΠΣ: it is indeed probable that the description of the different astral risings and settings which follows (2) and which has virtually no relevance to the rest of the text is most plausibly explained as intended to aid the understanding of an accompanying paraepigramma. However, that such a paraepigramma was the work of our author may well be doubted, since, as will be shown, he disagrees with the paraepigrammatists on a number of points.

Both Aristotle and Theophrastus reveal, as one would expect from their interest in astronomy and meteorology, a familiarity with the material of the paraepigrammata (e.g. *Mete.* 361b35-6, *De Vent.* 48); that either of them composed a paraepigramma is, however, highly unlikely in the absence of a definite ancient attribution.

Although the epithet ἀστρονομικός does not occur in either Aristotle or Theophrastus, it had certainly established itself in the language by their day, for we find it in Plato, e.g. *Resp.* 530a, *Prt.* 315c. Later (4) our author rather inconsistently uses ἡστρολόγησαν. The likelihood is that in the fourth century the following were treated as synonymous pairs: ἀστρολογικός (*Ar. A.Pr.* 46a19)—ἀστρονομικός (*Pl. Resp.* 530a), ἀστρονόμος (*Pl. Resp.* 531a)—ἀστρολόγος (*Theophr. Met.* 8), ἀστρονομία (*Pl. Symp.* 188b)—ἀστρολογία (*Theophr. Met.* 27, *Arist. Cael.* 291a32) and ἀστρονομέω (*Pl. Thu.* 174a)—ἀστρολογέω (*Sosip. fr.* 1.15:Kock).⁹

Section 2

εἰσὶ δὲ δύοσεις διτταί· οἳ τε γὰρ ἀφανισμοὶ δύοσεις εἰσὶ· τοῦτο δὲ ἐστὶν ὅταν ἅμα συνδύνη τῷ ἡλίῳ τὸ ἄστρον, καὶ ὅταν ἀνατέλλοντος δύνη, ὁμοίως δὲ καὶ ἀνατολαὶ διτταί, αἱ μὲν ἐφῶι ὅταν προανατέλλῃ τοῦ ἡλίου τὸ ἄστρον, αἱ δὲ ἀκρόνυχαι ὅταν ἅμα δυομένῳ ἀνατέλλῃ.

The astral phenomena which the author presumably wishes to describe here are those which are observable to the ordinary man without any special knowledge

⁹ Capelle held that in Aristotle's time no distinction was made between ἀστρολόγος, ἀστρονόμος and μετεωρολόγος (*Philol.* 71, 1912, pp. 414 ff.; *Hermes* 47, 1912, pp. 514 ff.; *RE* S. 6. col. 315 ff.)

of astronomy or the aid of a globus, *i.e.* (a) the visible heliacal (or evening) setting (ὅταν ἅμα συνδύνη τῷ ἡλίῳ τὸ ἄστρον = VHS), (b) the visible cosmical (or morning) setting (ὅταν ἀνατέλλοντος δύνη = VCS), (c) the visible heliacal (or morning) rising (ὅταν προανατέλλῃ τοῦ ἡλίου τὸ ἄστρον = VHR) and (d) the visible acronychal (or evening) rising (ὅταν ἅμα δυομένῳ ἀνατέλλῃ = VAR). However, the terminology of (a), (b) and (d) accurately describes not visible but rather invisible astral events, namely (a) the true evening setting, (b) the true morning setting and (d) the true evening rising—all phenomena which have no role in practical astronomy and would be of interest only to an astronomer. While the language of (c) is accurate, it is at the same time startlingly inconsistent in relation to (a), (b) and (d). This linguistic imprecision led Heeger (p. 9) to conclude that the author of ΠΣ was ignorant of astronomy but it is scarcely in itself an adequate basis for this conclusion, since the description might well have been deemed adequately instructive for the type of reader for whom the work was intended (p. 308).

Kaibel (p. 118, note 1) claimed to detect in this passage the influence of Chrysippus' *Φυσικαὶ τέχναι* (*Dox. Graec.*, ed. Diels, p. 466), but Chrysippus (and, incidentally, also Geminus, *Isag.* 13) carefully distinguishes between ἀνατολή (= daily astral rising) and ἐπιτολή (= seasonal astral rising), a distinction which was either ignored by or unknown to the author of ΠΣ, for he never uses ἐπιτολή. Neither ἀνατολή nor ἐπιτολή is found in [Gem.] *Cal.*. The following table sets forth the frequency in this latter work of the verbs ἀνατέλλειν and ἐπιτέλλειν (both in the sense of seasonal rising):

	Democritus	Euctemon	Meton	Eudoxus	Callippus	Dositheus
ἀνατέλλειν	-	-	-	-	15	-
ἐπιτέλλειν	3	20	1	23	12	-

It will be seen that Callippus in the fourth century regarded as synonymous ἀνατέλλειν and ἐπιτέλλειν and so too presumably ἀνατολή and ἐπιτολή. In doing so he may have simply followed popular usage which is exemplified for the fifth century by Aeschylus, *PV.* 457 (ἀνατολή = seasonal rising) and for the third by Theocritus, *Id.* 13.25 (ἀνατέλλειν = seasonal rising) and which perhaps, in this astral context, never distinguished between ἀνατολή and ἐπιτολή or between their cognate verbs. On the other hand, the figures from [Gem.] *Cal.* for Democritus, Euctemon and Meton strongly suggest that the astronomers of the fifth century B.C. used only ἐπιτέλλειν (and presumably ἐπιτολή) to denote a seasonal rising and were followed in this usage by Eudoxus in the fourth century. This is also the practice of later writers on astronomy, such as Chrysippus and Geminus.

Neither Aristotle nor Theophrastus observed the distinction. The former in *Mete.* 361b23-36 uses both ἐπιτέλλειν and ἀνατολή of the seasonal rising of Orion and ἐπιτολή of that of Sirius. The latter, with similar inconsistency, in *Caus. Pl.* 2.19.4 uses ἐπιτολή of the seasonal rising of Sirius, in *De Vent.* 55 ἀνατέλλειν of that

of Orion and in *De Vent.* 17 ἀνατολή of the daily rising of stars in general.

The fact that Callippus and the Peripatetics, unlike their elder contemporary Eudoxus, did not adopt the definition of the fifth century astronomers is surprising. It may be that Callippus, wishing to enhance the popularity of his *parapegma*, deliberately avoided the new, specialist term and that the Peripatetics, with whom he alone of the *parapegmatists* is recorded as having had direct association, followed his example.¹⁰

ἑῶν: Later in this section the feminine form occurs twice (ἑῶα, ἑῶαι): one cannot tell whether the carelessness, to which this inconsistency is due, was that of the author or of a scribe.

ἀκρόνυχου: This is the only occurrence of the word in ΠΣ. Hesiod used the synonymous and older ἀκρονέφαιος (*Op.* 567). It would seem that ἀκρόνυχος was still unknown in the fifth century B.C.: at any rate, the *parapegmatists* from that century, who are mentioned in [Gem.] *Cal.*, do not use it: instead Democritus has ἅμα ἡλίῳ δύνοντι (once) and Euctemon ἐσπέριος (13 occurrences: in the calendar he monopolises this word). On the other hand ἀκρόνυχος has a firm place in the astronomical language of the fourth century: thus of the 21 occurrences of the word in [Gem.] *Cal.*, 20 are attributed to Eudoxus and 1 to Dositheus. Aristotle has ἀκρόνυχος just once (*Mete.* 367b26) and Theophrastus not at all.¹¹

αἱ μὲν οὖν τοῦ Ἀρκτούρου λεγόμεναι ἀνατολαὶ ἀμφοτέρως συμβαίνουσιν· ἡ μὲν γὰρ τοῦ χειμῶνος ἀκρόνυχός ἐστιν, ἡ δὲ μετοπωρινῇ ἑῶα. τῶν δ' ἄλλων αἱ πλεῖσται τῶν ὀνομαζομένων ἑῶαι, οἷον Πλειάδος καὶ Ὠρίωνος καὶ Κυνός.

The relevance of this passage either to an accompanying *parapegma* or to the text itself is not immediately obvious. It raises three questions: (a) Why from the large number of stars and constellations that by their risings and settings served the Greeks as signs of the weather are Arcturus, Pleiades, Orion and Sirius chosen for special mention? (b) Why are heliacal risings emphasised and thus, by implication, accorded more importance than acronychal risings? (c) Why, since *all* stars, apart from the circumpolar, have heliacal and acronychal risings, is Arcturus said to have its risings ἀμφοτέρως, *i.e.* at dawn and at nightfall, unlike “most of the well-known constellations”, which are said to have their risings at dawn? (a) Arcturus, Pleiades, Orion and Sirius are found as signs of weather-cum-season in Hesiod's *Opera*:¹² Arcturus VAR: 564-7 and VHR: 610; Pleiades VHR: 383 and VCS: 384, 614-17, 619-21; Orion VHR: 597-9 and VCS: 614-17, 619; Sirius VHR:

¹⁰ Callippus resided with Aristotle in Athens and seems to have influenced his views on astronomy: cf. D. R. Dicks, *Early Greek Astronomy to Aristotle*, London, 1970, p. 200.

¹¹ Cf. H. Bonitz, *Index Aristotelicus*, Berlin, 1870 (included with Bekker's text) and index to F. Wimmer, *op. cit.*

¹² When Hesiod recommended that a particular agricultural task be performed at the time of a particular astral appearance it may be assumed that he did so because he considered that at that time not only would the season be appropriate but also the weather would be favourable.

587 (implied) and culmination: 417-19 (implied). To them he adds Hyades VCS: 614-17. Clearly this group of five is made up of the stars and constellations which were first associated with weather or season by the Greeks. It was to be largely expanded by the *paraepgmata*.¹³ The phrase τῶν ὀνομαζομένων must be taken as denoting some, at least, of the additional stars and constellations popularised as weather signs by the latter, as well, of course, as the Hyades. By his specific reference to Arcturus, Pleiades, Orion and Sirius the author of ΠΣ acknowledges, consciously or unconsciously, their ancient role in popular weather lore and perhaps betrays the fact that it is with this lore, rather than with the data of the *paraepgmata*, he is concerned, thus reinforcing his earlier admission: τὰ μὲν οὖν ἐπὶ τοῖς ἄστροις δυομένοις καὶ ἀνατέλλουσιν ἐκ τῶν ἀστρονομικῶν δεῖ λαμβάνειν.

What the author of ΠΣ is certainly not doing is offering us evidence of a year divided into five seasons by astral appearances, as Heeger would have us believe: *Habemus insuper anni secundum stellarum apparentias divisi indicia haud dubia* (p. 31). It is true that (i), the author recognises a year of five seasons which he refers to as ἔαρ, θέρος, ὁπώρα, μετόπωρον and χειμῶν (44)—the same seasons known to Aristotle and Theophrastus (*Gen. An.* 784a18-19: ἔαρ, θέρος, μετόπωρον, χειμῶν, *Hist. An.* 543b18-20: ἔαρ, θέρος, φθινόπωρον (= μετόπωρον), χειμῶν, *Mete.* 347b37-348a2: ἔαρ, ὁπώρα, μετόπωρον, χειμῶν; *Caus. Pl.* 1.13.1, 3, 4: ἔαρ, θέρος, μετόπωρον, χειμῶν, *Hist. Pl.* 9.20.3: ὁπώρα, μετόπωρον); (ii) of the five astral appearances to which he draws our attention in this passage (emphatically in the case of Arcturus and less so in that of the others) three, *i.e.* Arcturus VHR (September 19-22), Pleiades VHR (May 21-23) and Sirius VHR (July 28), marked respectively the beginnings of μετόπωρον, θέρος and ὁπώρα for the Greeks in general; (iii) by describing Arcturus VHR as μετοπωρινή he probably alludes to its function as a marker of μετόπωρον.¹⁴ But in the five-fold seasonal division posited by Heeger Pleiades VCS (November 4-7), which, as Heeger failed to see, is ignored

¹³ Usually in the *paraepgmata* the astral appearance is associated with weather—either with a particular kind of weather (e.g. [Gem.] *Cal.*, p. 230: ἐν δὲ τῇ δ'... Καλλιπῶ τοῦ Ταύρου ἡ κέρκος ἐπιτέλλει νότια.) or, by use of the verb ἐπισημαίνει, with weather change in general (e.g. *ibid.*: ἐν δὲ τῇ ιγ'... Καλλιπῶ τοῦ Ταύρου ἡ κεφαλὴ ἐπιτέλλει ἐπισημαίνει). Rarely the association is with season (e.g. *ibid.*: ἐν δὲ τῇ ιγ' Εὐκτῆμονι Πλειάς ἐπιτέλλει θέρους ἀρχή). When, as sometimes happens, an astral appearance is mentioned without any reference to weather or season (e.g. *ibid.*: ἐν δὲ τῇ κζ' Εὐδόξῳ Λύρα ἀκρόνυχος ἐπιτέλλει) it is not taken into account for the purpose of this paper. The following is a full list, in alphabetical order, of the stars and constellations which, through their visible risings and settings, are explicitly associated with weather or season in [Gem.] *Cal.*: Aquarius, Aquila, Arcturus, Aries, Cancer, Capella, Capricornus, Corona, Delphinus, Gemini, Haedi, Hyades, Leo, Libra, Lyra, Orion, Pegasus, Pisces, Pleiades, Sagittarius, Scorpio, Sirius, Spica Virginis, Taurus, Vindemiatrix, Virgo.

¹⁴ In this paper all dates for astral phenomena are adapted from the tables of E. J. Bickerman, *Chronology of the Ancient World*, London, 1968, pp. 143-5, which have themselves been adapted from F. K. Ginzel, *Handbuch der math. und tech. Chronologie*, Leipzig, 1906-14,

here, would have an essential place as marking the beginning of χειμών. Moreover, what of Arcturus VAR (February 26-March 1) and Orion VHR (June 29-30)? It is clearly impossible for the latter to have any connection whatsoever with the remaining two seasons, ἔαρ and χειμών, falling as it does about midway in θέρος.¹⁵ For Hesiod (*Op.* 564-70) Arcturus VAR marked the beginning of spring, and it probably continued to do so for centuries not only for the common people but also for scientific thinkers like Euctemon and Thucydides.¹⁶ But here it is unequivocally described as a phenomenon which occurs not at the beginning of spring but *within* winter and does not therefore serve as a seasonal marker. It follows that for our author the beginning of spring was marked by some astronomical event which occurred somewhat later than March 1. [Hippocrates] *Vict.* 3.68 provides reason to believe that by the end of the fifth century B.C. a second tradition had been established, according to which spring began at the equinox (March 24, 400 B.C.): τὸν μὲν οὖν ἐνιαυτὸν ἐς τέσσερα μέρη διαιρέω, ἅπερ μάλιστα γινώσκουσιν οἱ πολλοί, χειμῶνα, ἦρ, θέρος, φθινόπωρον. χειμῶνα μὲν ἀπὸ Πλειάδων δύσιος ἄχρι ἰσημερίας ἡαρινῆς, ἦρ δὲ ἀπὸ ἰσημερίας μέχρι Πλειάδων ἐπιτολῆς, θέρος δὲ ἀπὸ Πλειάδων μέχρι Ἀρκτούρου ἐπιτολῆς, φθινόπωρον δὲ ἀπὸ Ἀρκτούρου μέχρι Πλειάδων δύσιος.¹⁷ This is the tradition followed by our author with regard to Arcturus VAR; he is of course at variance with it in naming five rather than four seasons. It is probable that his seasons were defined as follows ἔαρ: Equinox to Pleiades VHR; θέρος: Pleiades VHR to Sirius VHR; ὁπώρα: Sirius VHR to

II, pp. 520 ff. (unavailable to me). They are valid for the latitude of Athens, 38°, in the period 500-100 B.C..

Arcturus VHR = Beginning of μετόπωρον: Euctemon, [Gem.] *Cal.* p. 214; Arist. *Hist. An.* 565b3-4; Theophr. *Hist. Pl.* 9.8.2; [Hippoc.] *Vict.* 3.68 (where φθινόπωρον = μετόπωρον). Pleiades VHR = Beginning of θέρος: Euctemon, [Gem.] *Cal.*, p. 230; Arat. *Phaen.* 266. Sirius VHR = Beginning of ὁπώρα: Hom. *Il.* 5.5 (ἀστὴρ ὁπωρινός); so for Euctemon, according to W. K. Pritchett and B. L. van der Waerden (following A. Boeckh, *Über die vierjährigen Sonnenkreise der Alten*, Berlin, 1863 and A. Rehm, *Sitzungsberichte der heidelberger Akademie der Wissenschaften, phil.-hist. Klasse*, IV, 1913, Abhandlung 3), "Thucydidean Time-Reckoning and Euctemon's Seasonal Calendar", *BCH.* LXXV, 1961, p. 39.

¹⁵ According to Boeckh, *op. cit.* p. 75, Orion VHR marked the beginning of ὁπώρα for Aristotle and Theophrastus. If one accepts this as true for the author of ΠΣ, Sirius VHR is then left here without a function as a seasonal marker and so the weakness of Heeger's argument remains unaffected.

¹⁶ Cf. A. W. Gomme, *A Historical Commentary on Thucydides*, Oxford, 1956, III, 699-715 (esp. 709) and W. K. Pritchett and B. L. van der Waerden, *op. cit.* pp. 29-30: the latter argue that Euctemon and Thucydides had in mind the true evening rising of Arcturus (March 6, Lat. 38°, 400 B.C.), not its visible evening rising; a decision on this matter is not necessary for the purpose of this paper, as the event remains, in either case, connected with spring, not with winter.

¹⁷ The weight of scholarly argument would seem to favour a date c. 400 B.C. for this work: W. H. S. Jones, Hippocrates (Loeb), London and Cambridge, Mass., 1979, pp. LXV-LXVI.

[Aristotle], *Pr.* 942b29, subscribes to the same tradition in giving the vernal equinox as marking the boundary between winter and summer—here ἔαρ is treated as an integral part of θέρος (so too Thuc. e.g. 4.117.1).

Arcturus VHR; μετόπωρον: Arcturus VHR to Pleiades VCS; χειμών: Pleiades VCS to Equinox.

(b) When the author of ΠΣ states that “most of the well-known constellations” have their risings at dawn, he means that their heliacal, rather than their acronychal, risings are meteorologically significant. With regard to the relative importance of heliacal and acronychal risings for Greek popular meteorology, one may note that as signs of weather-cum-season Hesiod (*Op.*) mentions four heliacal risings—three specifically (Pleiades VHR: 383, Orion VHR: 597-9, Arcturus VHR: 610) and one implicitly (Sirius VHR: 587)—and only one acronychal rising (Arcturus VAR: 564-7). Moreover of the forty-six astral risings explicitly associated with weather in [Gem.] *Cal.*, six (= 13%) are distinguished as heliacal (Democritus: 2, Eudoxus: 4) and seven (= 15%) as acronychal (Euctemon: 4, Eudoxus: 3), while all of the remaining thirty-three (= 72%), which lack a temporal qualification (Democritus: 1, Euctemon 13, Callippus: 19), may with certainty be identified as heliacal, owing to the positions accorded to them in the calendar’s zodiacal schema (e.g. the rising of Orion on Gemini 29, according to Democritus, p. 232, can only be heliacal).¹⁸ Thus in giving precedence to heliacal over acronychal risings the author of ΠΣ has the support both of the paraepematisers and of the older tradition which is represented by Hesiod.

(c) As to the uniqueness accorded here to Arcturus one may note that this is the only astral body to which meteorological significance is attached by Hesiod (*Op.*) at its acronychal (567) as well as at its heliacal (610) rising. However, in [Gem.] *Cal.*, although change of weather is associated with both the heliacal and acronychal risings of Arcturus (VHR: Euctemon and Eudoxus, p. 214; VAR: Euctemon and Eudoxus, p. 226), this is also true of Capella (VHR: Euctemon, p. 230; VAR: Euctemon, p. 214), Corona (VHR: Euctemon, p. 216; VAR: Eudoxus, p. 228), Pleiades (VHR: Euctemon, p. 230, and Eudoxus, p. 232; VAR: Euctemon, p. 216) and Sirius (VHR: Euctemon and Eudoxus, p. 212; VAR: Eudoxus, p. 222). Yet the author of ΠΣ names Pleiades and Sirius as examples of constellations which, for the purpose of predicting the weather, are worthy of observation at their heliacal, rather than at their acronychal risings. It is clear, therefore, that in thus making

¹⁸ In alphabetical order the stars and constellations in question are (a) for risings: Aquarius (Callippus), Aquila (Democritus, Euctemon), Arcturus (Euctemon, Eudoxus), Aries (Callippus), Cancer (Callippus), Capella (Euctemon), Capricornus (Callippus), Corona (Euctemon, Eudoxus), Delphinus (Euctemon), Gemini (Callippus), Haedi (Euctemon), Hyades (Euctemon), Leo (Callippus), Libra (Callippus), Lyra (Democritus, Euctemon), Orion (Democritus), Pegasus (Euctemon), Pisces (Callippus), Pleiades (Euctemon, Eudoxus), Sagittarius (Callippus), Scorpio (Eudoxus, Callippus), Sirius (Euctemon, Eudoxus), Spica Virginis (Callippus), Taurus (Callippus), Vindemiatrix (Euctemon), Virgo (Callippus); (b) for settings: Aquila (Euctemon), Arcturus (Euctemon), Aries (Callippus), Gemini (Callippus), Hyades (Euctemon, Eudoxus), Leo (Callippus), Libra (Callippus), Lyra (Euctemon, Eudoxus), Orion (Euctemon, Eudoxus, Callippus), Pegasus (Euctemon), Pleiades (Democritus, Euctemon, Eudoxus, Callippus), Scorpio (Euctemon, Eudoxus), Sirius (Euctemon, Eudoxus), Taurus (Callippus).

320 Theophrastus

Arcturus unique he is in disagreement with Euctemon and Eudoxus and probably with the parapegmatists in general, while on the other hand he may be indebted to the Hesiodic tradition.

Πλειάδες: Only the singular form is found in ΠΣ, here and in section 6. The following table sets out the frequency of singular and plural forms of this word in Aristotle, Theophrastus and [Gem.] *Cal.*¹⁹

	Aristotle	Theophrastus	[Gem.] <i>Cal.</i>
Singular	9	8	1 ²⁰
Plural	2	1	10 ²¹

Clearly our author is here following Peripatetic practice which is quite different from that of the parapegmatists quoted in [Gem.] *Cal.*

Section 3

τῶν δὲ λουπῶν σημείων ἓνια μὲν ἴδια κατὰ πάσας χώρας ἐστὶν ἐν ὅσαις ὄρη ὑψηλὰ καὶ αὐλῶνές εἰσι, μάλιστα δὲ ὅσα πρὸς θάλασσαν καθήκει τῶν ὑψηλῶν. τῶν τε γὰρ πνευμάτων ἀρχομένων τὰ νέφη προσπίπτει πρὸς τοὺς τοιοῦτους τόπους, καὶ μεθισταμένων εἰς τὸνναντίον ἀντιμεθίστανται καὶ ὑγρότερα γινόμενα διὰ βάρος εἰς τὰ κοῖλα συγκαθίζει. διὸ δεῖ προσέχειν οὐ ἂν τις ἰδρυμένος ᾗ. ἔστι γὰρ αἰεὶ τινα λαβεῖν τοιοῦτον γνώμονα καὶ ἔστι σαφέστατα σημεῖα τὰ ἀπὸ τούτων.

The process by which rain is here envisaged as being produced seems to be as follows: the clouds are propelled by the winds against mountain tops; when the winds change direction the clouds withdraw from the mountain tops; having become laden with moisture and consequently heavier they sink to lower altitudes and at the same time, or shortly afterwards, release rain.

The aetiology of rain offered by Aristotle and Theophrastus is succinctly stated by Olympiodorus, *In Arist. Mete.*, p. 80, 30 (Stüve): ἰστέον δὲ ὅτι ὁ μὲν Ἀριστοτέλης αἴτιον λέγει τῆς εἰς ὕδωρ μεταβολῆς τὴν ψύξιν μόνον· Θεόφραστος δὲ οὐ μόνον τὴν ψύξιν αἰτίαν φησὶ τῆς τοῦ ὕδατος γενέσεως, ἀλλὰ καὶ τὴν πίλησιν. ἰδοὺ γὰρ ἐν Αἰθιοπία μὴ οὐσης ψύξεως ὅμως ὑετὸς κατάγεται διὰ τὴν πίλησιν· φησὶ γὰρ ὄρη εἶναι ἐκεῖσε ὑψηλότατα, εἰς ἃ τὰ νέφη προσπταίουσι καὶ εἰθ' οὕτως ὑετὸς καταρρήγνυται διὰ τὴν γινομένην πίλησιν. It is clear that the author of ΠΣ does not present Aristotle's view, for he does not refer, either explicitly or implicitly, to ψύξις. Moreover for him winds and high mountains are the factors combining to produce rain, whereas Aristotle held that winds do not blow above

¹⁹ The figures for Aristotle are based on Bonitz, *op. cit.*, excluding his references to the possibly spurious *Pr.* 1.3, 859a23 and *Pr.* 1.17, 861a28; those for Theophrastus and [Gem.] *Cal.* have been established by a manual count.

²⁰ Euctemon, p. 230.

²¹ Democritus: 2 (p. 218, p. 228), Euctemon: 3 (p. 216, p. 220, p. 228), Eudoxus: 4 (p. 216, p. 220, p. 228, p. 232), Callippus: (p. 220).

high mountains (*Mete.* 340b37-8).

Theophrastus' doctrine of *πίλησις* is also stated (a) in *De Vent.* 5: οὐ μικρὰ δ' ἐνταῦθα ἀλλὰ μεγίστη ῥοπή τὸ τὰς χώρας ὕψος ἔχειν. ὅπου ἂν προσκόψη τὰ νέφη καὶ λάβῃ στάσιν, ἐνταῦθα καὶ ὕδατος γένεσις, and (b) by Proclus, *In Plat. Tim.* 1.120.25: καὶ γὰρ τοῦτο ἐν εἶναι αἴτιον ὁμβρῶν φησὶν ὁ Θεόφραστος τὴν τῶν νεφῶν πίλησιν πρὸς τινα τῶν ὀρῶν. It seems also to underlie the following passage on the formation of clouds from a fragment of an anonymous Syriac translation of a work on meteorology attributed to Theophrastus and edited by Ewald Wagner and Peter Steinmetz: "Die Wolke aber entsteht aus zwei Gründen: entweder wegen der Dicke und Dicht[e] [der] Luft und ihre Verwandlung in wässerige Substanz oder wegen der vielen Dämpfe, [die auf]steigen und sich in der Wolke mischen aus dem Meer oder den übrigen feuchten Dingen. [Abe]r die Luft verdichtet und verdickt sich aus zwei Gründen: entweder durch die Kälte oder durch entgegengesetzte Winde, die sie pressen und verdichten." (Wagner's translation; italics mine).²² There can be little doubt that the author of ΠΣ, in stressing the agency of high mountains (*cf.* *De Vent.*, Olympiodorus and Proclus) and winds (*cf.* Syriac text; probably implied in *De Vent.*, Olympiodorus and Proclus) in the genesis of rain is subscribing to the theory of *πίλησις* attributed to Theophrastus. This theory in fact long antedated Theophrastus, having been expounded by Anaximenes (D-K, A 17), Xenophanes (D-K, A 46) and [Hippocrates], *De aer. aq. loc.* 2.34.²³ But Theophrastus alone is recorded as explicitly associating *πίλησις* with mountains.

The practical application of the theory is seen later in ΠΣ when signs of rain are derived from the appearance of clouds on Mount Hymettus (20, 24) and on the mountains of Euboea (22) and signs of storm (= a combination of wind and rain) from their appearance on Mount Hymettus, Mount Athos, Mount Olympus (43), ἄκρα Γυρῶν (45) and Mount Parnes (47).

Section 4

Διὸ καὶ ἀγαθοὶ γεγένηται κατὰ τόπους τινὰς ἀστρονόμοι ἔνιοι, οἷον Ματρικέτας ἐν Μηθύμνῃ ἀπὸ τοῦ Λεπετύμνου, καὶ Κλεόστρατος ἐν Τενέδῳ ἀπὸ τῆς Ἰδης,

²² *Der syrische Auszug der Meteorologie des Theophrast.* Mainz: Akademie der Wissenschaften und der Literatur; Wiesbaden: in Kommission bei Franz Steiner 1964 (Abh. Mainz, 1964, 1), p. 28. H. B. Gottschalk, *Gnomon* xxxvii (1965), pp. 760-1, holds that the Greek original was not a work by Theophrastus but rather a late compendium; he concedes, however, that most of this was derived from Theophrastus' *Metarsiologika*. There exists an Arabic epitome of the Syriac work which was published by G. Bergsträsser in 1918 (*Sitzungsberichte der heidelberger Akademie, phil.-hist. Klasse*, 1918, 9); from this, however, the section dealing with the causes of rain is missing. The Syriac passage is discussed by Drossaart Lulofs in *Autour d'Aristote. Recueil d'études de philosophie ancienne et médiévale offert à Monseigneur A. Mansion*, Louvain, 1955, pp. 440-1.

[For the oriental tradition, see now Hans Daiber's contribution to this volume = chapt. 8. (WWF & DG)]

²³ It also appears in Epicurus, *Ad Pyth.* 99.

καὶ Φαεινὸς Ἀθήνησιν ἀπὸ τοῦ Λυκαβητιοῦ τὰ περὶ τὰς τροπὰς συνεῖδε, παρ' οὗ Μέτων ἀκούσας τὸν τοῦ ἐνὸς δέοντα εἴκοσιν ἐνιαυτῶν (κύκλον) συντάξεν. ἦν δὲ ὁ μὲν Φαεινὸς μέτοικος Ἀθήνησιν ὁ δὲ Μέτων Ἀθηναῖος. καὶ ἄλλοι δὲ τὸν τρόπον τοῦτον ἡστρολόγησαν.

“Die Sonnenwende und in Anschluss daran der metonische Zyklus kommen als Fremdkörper herein . . .” (Rehm, *op. cit.* 137). It is true that this section has but the most tenuous connection with the main theme. Its purpose is probably to show how different localities, just as they may produce experts in astronomy, because of the presence in them of mountains, so too may produce experts in weather prediction (such as the γνώμων of the previous section).

The reference to Meton's 19-Year Cycle, which was introduced in 432 B.C., provides a *terminus post quem* for ΠΣ. It does not, however, necessarily follow that it was written soon after this date, for according to Diodorus, Meton's cycle was still widely used in the first century B.C.: μέχρι τῶν καθ' ἡμᾶς χρόνων οἱ πλείστοι τῶν Ἑλλήνων χρώμενοι τῇ ἐννεακαιδεκαετηρίδι . . . (12.36).²⁴

Euctemon was a contemporary of Meton and is in fact associated with him by Ptolemy (*Alm.* 3.1) in observing the summer solstice. It is, therefore, scarcely credible that the author of ΠΣ, if he were conscious of a debt to Euctemon (Rehm) would have failed to mention his name here. It is surprising that Meton is not here credited with observation of the solstice: perhaps, unlike Matriketas, Cleostratus and Phaeinus, he was not known to have used a mountain for this purpose, though Philochorus' statement (Schol. *ad Ar. Av.* 997) that he erected a heliotropion near the wall of the Pnyx may suggest that he made observations from the hill.²⁵

Since Phaeinus is here said to have been the teacher of Meton he was probably the older man.

Of Matriketas nothing further is known. If, as one would expect, the names are here stated in chronological order, he antedated Cleostratus who lived in the second half of the sixth century B.C.²⁶ Since for his observations he used Mount Lepetymnos near Methymna on the north coast of Lesbos, he may have been a native of that island: in that case a reference to him might naturally come from Theophrastus or from someone closely influenced by Theophrastus.

Section 5

ἄλλα δέ ἐστι σημεῖα ἃ λαμβάνεται ἀπὸ τε τῶν ζώων καὶ τῶν κατ' οἰκίαν ἐτέρων τινῶν τόπων καὶ παθημάτων· μάλιστα δὲ κυριώτατα (τὰ) ἀπὸ τοῦ ἡλίου καὶ τῆς σελήνης· ἡ γὰρ σελήνη νυκτὸς οἶον ἡλιός ἐστι· διὸ καὶ αἱ σύνοδοι τῶν μηνῶν χειμέριοι εἰσιν, ὅτι ἀπολείπει τὸ φῶς τῆς σελήνης ἀπὸ τετραδὸς φθίνοντος μέχρι

²⁴ I am assuming that Diodorus is not here silently copying a source.

²⁵ Rehm is not convincing when he claims that the author of ΠΣ here reveals an antipathy to Meton by implying that his 19-Year Cycle ultimately derived from the solstice observations of his master Phaeinus.

²⁶ For Cleostratus' date cf. Pliny, *NH.* 18.231 and Censorinus *D.N.* 18.5.

τετράδος ἵσταμένου. ὥσπερ οὖν ἡλίου ἀπόλειψις γίνεται κατὰ τὸν ὅμοιον τρόπον καὶ τῆς σελήνης ἔκλειψις.

Doubting the MSS, Schneider conjectured ἀπό τε τῶν ζώων τῶν κατ' οἰκίαν καὶ ἐτέρων τινῶν τρόπων καὶ παθημάτων and was followed by Wimmer in thus transposing καί. This transposition must be decisively rejected, since its effect is to establish a category of weather-predictive media (*i.e.* domestic animals) which our author nowhere recognises in the body of the work. The substitution of τρόπων for τόπων is attractive (even more so perhaps would be τροπῶν) but unnecessary: the words τῶν κατ' οἰκίαν ἐτέρων τινῶν τόπων καὶ παθημάτων may be taken as a broad, general description of household affairs. What we have in this passage is a reference to three categories of predictive media, *i.e.* zoological, domestic and solar-cum-lunar, categories which can be identified later in the work, as will be shown. (They are later abbreviated as Z, D and C (i) respectively.)

ἡ γὰρ σελήνη . . . ἔκλειψις: The ideas and terminology are unmistakably Peripatetic: cf. Arist. *Gen. An.* 777b26, γίνεται γὰρ ὥσπερ ἄλλος ἥλιος ἐλάττων (*sc.* ἡ σελήνη), 738a20-2, αἱ δὲ τῶν μηνῶν σύνοδοι ψυχραὶ διὰ τὴν τῆς σελήνης ἀπόλειψιν, διόπερ καὶ χειμερίους συμβαίνει τὰς συνόδους εἶναι τῶν μηνῶν, and Theophr. *De Vent.* 17, οἷον γὰρ ἀσθενὴς ἡλιός ἐστι (*sc.* ἡ σελήνη) . . . καὶ αἱ σύνοδοι τῶν μηνῶν χειμερινώτεραι. Aristotle consistently used ἀπολείπειν (*e.g.* *An. Post.* 98a33) and ἀπόλειψις (*e.g.* *Gen. An.* 738a21) of the moon's waning and ἔκλειψις (*e.g.* *Mete.* 367b20), in relation to the moon, only in the sense of eclipse, a sense which the latter word cannot bear here. None of these words is found in Theophrastus in a context of the sun or moon but his use of them in this context probably did not differ from that of Aristotle. Kaibel was, therefore, surely justified in removing ἔκλειψις as a gloss (p. 117).

Sections 6-9

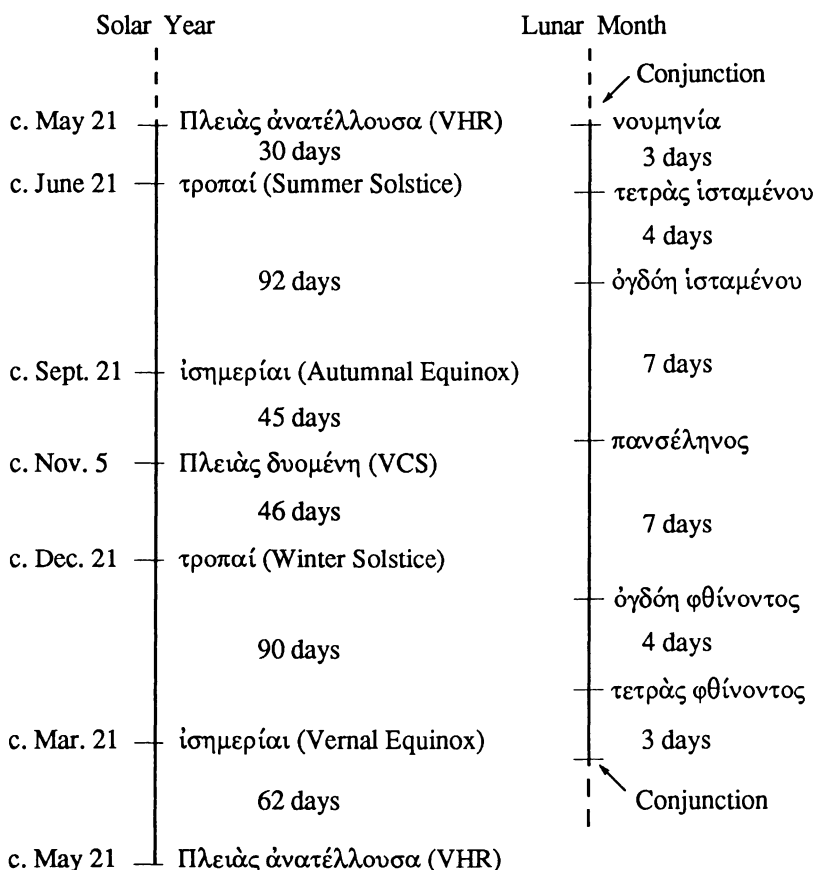
δεῖ οὖν προσέχειν μάλιστα ταῖς ἀνατολαῖς ταῖς τούτων καὶ ταῖς δύσεσιν ὁποίας ἂν ποιῶνται τὸν βουλούμενον προγινώσκειν. πρῶτον μὲν οὖν ληπτέον ὅτι αἱ διχοτομίαι διορίζουσι τὰς ὥρας, ὥστε ἐπὶ τούτων δεῖ ἀθρεῖν καὶ ἐνιαυτὸν καὶ μῆνα καὶ ἡμέραν. διχοτομεῖ δὲ τὸν μὲν ἐνιαυτὸν Πλειάς τε δυομένη καὶ ἀνατέλλουσα· ἀπὸ γὰρ δύσεως μέχρι ἀνατολῆς τὸ ἥμισυ τοῦ ἐνιαυτοῦ ἐστίν. ὥστε δίχα τέμνεται ὁ πᾶς χρόνος. (7) ὁμοίως δὲ καὶ αἱ τροπαὶ καὶ ἡμερίαι ποιοῦσιν. οἷα τις ἂν οὖν ἦ κατάστασις τοῦ ἀέρος Πλειάδος δυομένης, οὕτω ἔχει ὡς ἐπὶ τὸ πολὺ μέχρι τροπῶν, κἂν μεταβάλλῃ, μετὰ τροπᾶς· ἐὰν δὲ μὴ μεταβάλλῃ, διέχει ἕως ἡμερίας, κάκειθεν ὡσαύτως μέχρι Πλειάδος, καὶ ἀπὸ ταύτης μέχρι τροπῶν θερινῶν, καὶ ἐντεῦθεν μέχρι ἡμερίας, καὶ ἀπὸ ἡμερίας μέχρι Πλειάδος δύσεως. (8) ὡς δ' αὐτῶς ἔχει καὶ περὶ τὸν μῆνα ἕκαστον· διχοτομοῦσι γὰρ αἱ τε πανσέληνοι καὶ αἱ ὀγδοαὶ καὶ αἱ τετράδες, ὥστε ἀπὸ νομηνίας ὡς ἀπ' ἀρχῆς δεῖ σκοπεῖν. μεταβάλλει γὰρ ὡς ἐπὶ τὸ πολὺ ἐν τῇ τετράδι, ἐὰν δὲ μή, ἐν τῇ ὀγδόῃ, εἰ δὲ μή, πανσελήνῳ. ἀπὸ δὲ πανσελήνου εἰς ὀγδόην φθίνοντος, καὶ ἀπὸ ταύτης εἰς τετράδα, ἀπὸ δὲ τετράδος εἰς τὴν νομηνίαν. (9) ὡς δ' αὐτῶς

324 Theophrastus

καὶ ἐπὶ τῆς ἡμέρας ἔχουσιν αἱ μεταβολαὶ ὥς ἐπὶ τὸ πολὺ. ἀνατολὴ γὰρ καὶ πρωὶ καὶ μεσημβρία καὶ δείλη καὶ δύσις, καὶ τὰ τῆς νυκτὸς μέρη τὰ ἀνάλογα ταὐτὸ ποιεῖ τοῖς εἰρημένοις περὶ πνευμάτων καὶ χειμῶνος καὶ εὐδίας. μάλιστα γὰρ ἐὰν μέλλῃ μεταβάλλειν, ἐν ταῖς διχοτομίαις μεταβάλλει. καθόλου μὲν οὖν τὰς ὥρας οὕτω δεῖ παρατηρεῖν, καθ' ἕκαστα δὲ τῶν σημείων κατὰ τὸν ὑπογεγραμμένον τρόπον.

The solar year and lunar month are seen as cycles, each divided in six sections by six astronomical markers which, we are told, deserve special attention from the would-be weather-prophet. The day and night on the other hand are each divided in four sections by five markers, those for the night not being stipulated.

The διχοτομία of the solar year and lunar month which is presented here may be illustrated by the following diagram:



Aristotle in *Gen. An.* 777b21-2 mentions a system which is probably a truncated form of the lunar διχοτομία of ΠΣ: εἰσὶ δὲ περίοδοι σελήνης πανσέληνοί τε καὶ

φθίσεις καὶ τῶν μεταξὺ χρόνων αἱ διχοτομίαι—if one assumes that here νοσηνία is taken for granted, and that φθίσεις corresponds to both τετράς φθίνοντος and τετράς ἱσταμένου of ΠΣ and τῶν μεταξὺ χρόνων αἱ διχοτομίαι to both ὀγδὴ φθίνοντος and ὀγδὴ ἱσταμένου of ΠΣ.²⁷

Our author's διχοτομία of the solar year is unique in employing the triad: equinoxes, solstices and Pleiades. Euctemon and Eudoxus, both of whom have been alleged to have influenced ΠΣ (Euctemon: Rehm, Eudoxus: Boehme), had employed the equinoxes and solstices to determine as precisely as possible the length of the astronomical seasons but in this process the Pleiades had no part.²⁸

From Pleiades VHR to Pleiades VCS there are approximately 167 days and from Pleiades VCS to Pleiades VHR approximately 198 days: τὸ ἥμισυ is, therefore, used here in the sense of "approximately one half"²⁹; likewise διχοτομεῖ means "cuts into two sections" not "cuts into halves" (*pace* Hort). The author is not concerned with the exact interval between the relevant appearances of the Pleiades nor, presumably, between, on the one hand, the vernal and autumnal equinox and, on the other, the summer and winter solstice. It is the διχοτομίαι themselves that matter. The special use which he makes here of the Pleiades as well as his lack of precision in astronomical matters—even though this is not required by the context—makes it difficult to see him as one strongly influenced by Euctemon or Eudoxus or indeed by the parapegmatis in general.

It is possible that a bisection of the solar year by Pleiades VHR and Pleiades VCS was known to the Greeks before Euctemon defined the seasons by means of the equinoxes and solstices. That the older bisection continued to be recognised in the popular mind beside the new seasons is suggested by the present passage and by Pliny (*NH.* 18.280), for whom the interval between Pleiades VHR and Pleiades VCS was *semenstre spatium*.

At first sight it may seem difficult to reconcile the theory of meteorologically significant διχοτομίαι with the rationale of the rest of the work, for one might argue, for example, that if the fine weather prevailing at the summer solstice is, according to the διχοτομία theory, to continue until the autumnal equinox, then any signs of rain that may present themselves from birds, animals or celestial phenomena during this interval (καθ' ἕκαστα δὲ τῶν σημείων) can have no validity. There is, however, no real contradiction, for the predictions based on the διχοτομίαι are, by definition, of a long-range kind, whereas the predictions which are set forth in the main part of the work apply by and large to the immediate future.

On the basis of the preceding study of the Introduction (Sections 1-9) we can assert the following. The author's interest lies in the folklore of weather prediction rather than in the quasi-scientific methods of the parapegmatis. It is of course

²⁷ The same lunar διχοτομία is found in Arat., *Phaen.* 805-10.

²⁸ Cf. D. R. Dicks, *Early Greek Astronomy to Aristotle*, London, 1970, pp. 88, 175.

²⁹ This usage is common: cf. e.g. Thuc. 4.83 and the proverb ἀρχὴ ἥμισυ παντός ([Arist.], *Pr.* 892a30).

to be expected that, like Greeks in general from the fifth century onwards, he was familiar with the *parapegmata* but there is no evidence that their creators exercised any special influence on him; on the contrary, he has been shown to differ from them on the following points: (a) his use of ἀνατολή for ἐπιτολή (only Callippus giving him some support here), (b) his attribution to Arcturus of a unique status as a weather sign, (c) his exclusive use of the singular Πλειάς and (d) his slipshod bisection of the solar year.

The Introduction has a certain coherence both within itself and with the remainder of the work. It reveals distinct Peripatetic traits. Since its explanation of how rain is produced differs fundamentally from that of Aristotle, he may now be rejected as its author and consequently of the work as a whole. The hypothetical claims of Theophrastus and of an anonymous Peripatetic student remain intact, however, and must now be considered through an analysis of the remainder of the work.

Chapters I-IV: Sections 10-54

The predictive phenomena employed by the author may be divided into the following 8 categories:

1. Phenomena of sunrise, sunset and lunar phases (= C(i)).
2. Other celestial phenomena, *i.e.* the planet Mercury, thunder, lightning, clouds, mist, comets, rainbow, weather galls, winds, snow, frost, solar phenomena other than those of sunrise and sunset (= C(ii)).
3. Domestic, *i.e.* oil-lamp, hearth-fire, household utensils (= D).
4. Marine, *i.e.* tide, swell, coastal noises, optical illusion at sea, floating thistle-down (= M).
5. Pathological, *i.e.* reactions of the human body to imminent change in the weather (= P).
6. Seasonal, *i.e.* the character of the weather of, or the occurrence of an extraordinary phenomenon in, one season taken as an indicator of the weather of the next season (= S).
7. Zoological, *i.e.* the behaviour of animals, birds, fish, insects (= Z).
8. Botanical: the flowering of the πρίνος (45, 49) and the σχίνος (55) are the only examples in ΠΣ (= B).

Only two signs remain outside these categories, that derived from πομφόλυγες (13) and that from ἀράχνια (29).

It will be found that these categories are arranged in the four chapters according to the pattern set out in Tables 1-4 (printed at the end of this paper), columns 1-4.³⁰ In chapter I we identify three homogeneous clusters, *i.e.* 10-13 = C(i), 15-

³⁰ As an example of my method of enumeration, I treat the following two statements as each conveying two observations: καὶ ἐὰν δύνῃ χειμῶνος ἢ ἔαρος εἰς νεφέλιον, τριῶν ἡμερῶν ὥς τὰ πολλὰ ἐπισημαίνει (11). καὶ ἐὰν ἀκτίνες ἀθρόαι ἀνίσχωνσιν ἀνιόντος ἢ δύνοντος, σημεῖον ὕδατος (13).

19 = Z and 20-2 = C(ii). Similar clusters recur in chapter II: 26-7 = C(i), 28-9 = Z and 31-3 = C(ii). In chapter III the two C(i)-observations occur together, while Z-clusters and C(ii)-clusters recur: 38-42 = Z (the homogeneity being disrupted by one M-observation) and 43 = C(ii). Chapter IV offers the same system of clustering: 50-1 = C(i), 51-2 = C(ii) and 52-3 = Z.

There is, therefore, a certain degree of design in the distribution of observations based on the predictive phenomena of categories C(i), C(ii) and Z, and that would seem to bespeak a single author for chapters I-IV. But two questions at once arise: how do we explain (a) C(ii)-observations and Z-observations which are not clustered and (b) all other observations? Before suggesting answers, I wish to consider the inherent propensity of ΠΣ to admit interpolations, in order to get a text free from such as are detectable.

ΠΣ opens with the words σημεία ὕδατων καὶ πνευμάτων καὶ χειμῶνων καὶ εὐδίων ὧδε ἐγράψαμεν. Thus the author distinguishes the theme of each of his four chapters. They begin as follows:

I: ὕδατος μὲν οὖν σημεία τὰ τοιαῦτα δοκεῖ εἶναι.

II: ὕδατος μὲν οὖν ταῦτα λέγεται σημεία (Ref. to chapter I). ἀνέμου δὲ καὶ πνευμάτων τάδε. (This chapter ends: πνευμάτων μὲν οὖν σημεία ταῦτα).

III: χειμῶνος δὲ τάδε.

IV: εὐδίας δὲ σημεία τάδε.

We have reason, therefore, to expect that chapters I, II, III and IV will deal exclusively with signs of rain, wind, storm and fine weather respectively or, at any rate, that each chapter will exclude signs appropriate to one of the others. But this does not happen: rather the homogeneity of each chapter is disrupted by meteorological intruders (= MIs, e.g. a sign of wind in chapter I) and that of chapters I, II and III also by signs of double import (= DISs, e.g. a sign of wind *and/or* rain in chapter I or chapter II). One instinctively suspects the genuineness of such disrupters. But before rejecting them *en masse* it is important to remind oneself that the author has imposed on himself an intractable system of classification. Since χειμῶν denotes a combination of ὕδωρ and ἄνεμος and since, in the nature of things, ὕδωρ may sometimes quickly succeed ἄνεμος, it is inevitable that a sign of one of these elements may also serve as a sign of one or both of the others. So signs of rain, wind and storm defy strict segregation, a fact which the author himself implicitly acknowledges in section 40: ὅσα ὕδωρ σημαίνει, χειμῶνα ἔχει.

One ought, therefore, to distinguish disrupters which are naturally inevitable (= natural meteorological intruders = NMIs) from those which have no basis in nature (e.g. a sign of fine weather in chapters I, II or III) and, therefore, blatantly violate the homogeneity of a chapter (= disruptive meteorological intruders = DMIs).³¹

³¹ One must hesitate to reject as spurious any MI which occurs in a μὲν . . . δέ combination, e.g. θαλαττία δὲ γλαυξ ἄδουσα χειμῶνος μὲν εὐδίαν σημαίνει, εὐδίας δὲ χειμῶνα (52). Here, since the μὲν clause is unquestionably genuine, the δέ clause, even though introducing a DMI, must also be so.

Suspicion of spuriousness attaches to an observation involving a NMI only when it offers information which is found elsewhere in ΠΣ in an appropriate context or in a more complete form. Furthermore, if the intrusive element in a DIS is not repeated in its appropriate context, we may surmise that the author, knowing that he has given all his information in the form of a DIS, saw no need to repeat it: in such cases the genuineness of a DIS is not in doubt (*e.g.* ὄρνιθες λουόμενοι μὴ ἐν ὕδατι βιοῦντες ὕδωρ ἢ χειμῶνας σημαίνουσι, chapter I, section 15, is not repeated in chapter III and may, therefore, be taken as genuine). Again, it is possible that interpolation may sometimes be responsible for converting what was originally a genuine single sign into one of double import: *e.g.* section 18, καὶ ἐρωδιὸς ὄρθριον φθεγγόμενος ὕδωρ ἢ πνεῦμα σημαίνει, where the interpolation may be confined to ἢ πνεῦμα and the sign may be genuine as a sign of rain alone. Despite these reservations with regard to DISs there remain some highly questionable occurrences. The frequency of DISs and MIs in the text as it stands is set out in Tables 1-4, columns 5-6. One must also suspect observations based on predictive phenomena which intrude as aliens into homogeneous clusters of such phenomena (= predictive intruders = PIs, *e.g.* a domestic phenomenon embedded in a zoological cluster), as well as repetitions and contradictions. The application of these criteria to the text identifies the following passages as interpolations.

Chapter I: Signs of Rain

13: ἀστέρες πολλοὶ διάττοντες ὕδατος ἢ πνεύματος, καὶ ὅθεν ἂν διάττωσιν ἐντεῦθεν τὸ πνεῦμα ἢ τὸ ὕδωρ.

i) ἀστέρες διάττοντες = PI: C(ii) in C(i)-cluster.

ii) ὕδατος ἢ πνεύματος = DIS

iii) Repeated in 37 (appropriate context) as a sign of wind alone: ὅθεν ἂν ἀστέρες διάττωσιν πολλοί, ἄνεμον ἐντεῦθεν· ἐὰν δὲ πανταχόθεν ὁμοίως, πολλὰ πνεύματα σημαίνουσι.

13: [ὑετοῦ δὲ σημεία] πομφόλυγες ἀνιστάμεναι πλείους ἐπὶ τῶν ποταμῶν ὕδωρ σημαίνουσι πολύ.

The phenomenon in question stands outside my categories of predictive phenomena. One may suspect that the word πομφόλυγας which occurs in the immediately following D-cluster and which there denotes a phenomenon of the lamp gave rise to the interpolation here of a sign based on πομφόλυγες of an altogether different kind. Moreover the phrase ὑετοῦ δὲ σημεία with which, in the MSS, this sentence opens, is entirely superfluous (bracketed by Schneider, Wimmer and Hort); it would, however, have been scarcely objectionable if one assumes that the sentence originated as a marginal note.

14: μικροὶ δὲ καὶ κεγχρώδεις καὶ λαμπροὶ (*sc.* οἱ μύκητες) ὕδωρ καὶ ἄνεμον.

i) ὕδωρ καὶ ἄνεμον = DIS

ii) Repeated in 42 (appropriate context) as a sign of storm: καὶ ἐὰν ὥσπερ κέγχροις πολλοῖς κατάπλεως ᾗ, χειμερίσει.

17: ἐὰν δὲ μέτριοι (sc. φανῶσιν ὄρνιθες οἱ βιοτεύουσιν ἐν νήσῳ), ἀγαθὸν αἰξὶ καὶ βοτοῖς, ἐὰν δὲ πολλοὶ ὑπερβολῇ, αὐχμὸν ἰσχυρόν.

i) ἀγαθὸν αἰξὶ καὶ βοτοῖς = DMI: appropriate to chapter IV—we have been told in the immediately preceding sentence: καὶ θέρους ὅταν πολλοὶ ἀθρόοι φανῶσιν ὄρνιθες οἱ βιοτεύουσιν ἐν νήσῳ, ὕδωρ σημαίνουσιν; therefore the phrase ἀγαθὸν αἰξὶ καὶ βοτοῖς probably is a synonym for εὐδία.

ii) αὐχμὸν ἰσχυρόν = DMI: while not appropriate, strictly speaking, to any of the four chapters, it is especially out of place in chapter I.

18: καὶ ὅλως βοῶν ἀνεμῶδες (sc. ἐρωδιός).

i) ἀνεμῶδες = NMI

ii) Repeated more fully in 28 (appropriate context): καὶ ὅλως βοῶν μέγα ἀνεμώδης (sc. ἐρωδιός).

19: χύτρα σπινθηρίζουσα πᾶσα περίπλεως ὕδατος σημεῖον.

χύτρα = PI: D in Z-cluster. Here the interpolator may have been prompted by the phrase ἐν οἰκίᾳ οἰκουμένη, which qualifies ὁ σπίνος in the immediately preceding sentence, to insert into a group of Z-signs a sign pertaining to a place of habitation but not at all connected with zoology.

22: μύρμηκες ἐν κοίλῳ χωρίῳ ἐὰν τὰ ψᾶ ἐκφέρωσιν ἐκ τῆς μυρμηκιᾶς ἐπὶ τὸ ὑψηλὸν χωρίον, ὕδωρ σημαίνουσιν, ἐὰν δὲ καταφέρωσιν, εὐδίαν.

i) μύρμηκες = PI: Z in C(ii)-cluster.

ii) εὐδίαν = DMI: appropriate to chapter IV.

24: ὅταν χιόνες πολλαὶ γίνονται, ὡς τὰ πολλὰ εὐετηρία γίνεται.

εὐετηρία = DMI: appropriate to chapter IV.

25: ἐὰν δὲ ὥσπερ κέγχροι μικροὶ λαμπροὶ πολλοί, ἀνέμου μὲν ὄντος εὐδίαν, μὴ ἀνέμου δὲ ὕδωρ ἢ ἄνεμον. ἔστι δ' ἄμεινον πρῶτον γίνεσθαι βόρειον ὕδωρ νοτίου καὶ τοῖς φυομένοις καὶ τοῖς ζώοις. δεῖ δὲ γλυκὺ εἶναι καὶ μὴ ἄλμυρόν τοῖς γευομένοις, καὶ ὅλως ἔτος βέλτιον νοτίου βόρειον καὶ ὑγιεινότερον. καὶ ὅταν (πάλιν) ὀχεύονται πρόβατα ἢ αἰγες, χειμῶνος μακροῦ σημεῖον.³²

i) εὐδίαν = DMI: appropriate to chapter IV.

ii) ὕδωρ ἢ ἄνεμον = DIS

iv) The passage on the relationship between weather and the health of plants and animals is essentially extraneous to the main theme.

³² πάλιν: conj. Schneider.

330 Theophrastus

v) χειμῶνος μακροῦ = DMI:appropriate to section 56 (χειμών = winter).

Chapter II: Signs of Wind

27: ἐὰν δὲ ὀρθὸς καὶ μὴ καλῶς ἐγκεκλιμένος μέχρι τετράδος καὶ εὐκυκλος (sc. ὁ μείζ), εἴωθε χειμάζειν μετρί διχομηνίας.

i) χειμάζειν = NMI: appropriate to chapter III.

ii) Repeated in 38 (appropriate context) as a sign of storm alone: τὸ σελήνιον ἐὰν ὀρθὸν ἢ μέχρι τετράδος καὶ εὐκυκλον, χειμάσει μέχρι διχοτόμου.

27: σημαίνει ζοφώδης μὲν ὦν ὕδωρ, πυρώδης δὲ πνεῦμα (sc. ὁ μείζ).

i) ὕδωρ = NMI: appropriate to chapter 1.

ii) Repeats 12: ἐὰν μὲν ἢ πυρώδης, πνευματώδη σημαίνει τὸν μῆνα (sc. ὁ μείζ), ἐὰν δὲ ζοφώδης, ὕδατώδη. The presence of a NMI does not of itself justify the rejection of a passage (cf. p. 327-8); hence 12, although containing a NMI (πνευματώδη—τὸν μῆνα), may be allowed to stand in preference to 27 on the grounds that it comes earlier in the text—27 is likely to have originated as a marginal note written by someone remembering 12—and is more precise in its import (prediction valid for month only).

29: παρήλιος ὁπόθεν ἂν ἢ ὕδωρ ἢ ἄνεμον σημαίνει.

ὕδωρ ἢ ἄνεμον = DIS. An elaborate and precisely described combination of two parhelioi and a simultaneous halo has already been said in 22 (appropriate context) to be a precursor of rain alone: ἐὰν παρήλιοι δύο γένωνται καὶ ὁ μὲν νοτόθεν, ὁ δὲ βορρᾶθεν, καὶ ἄλλως ἅμα ὕδωρ διὰ ταχέων σημαίνουσι. It is simply incredible that Theophrastus or indeed any Peripatetic scholar, however lowly, would not have been conscious of the distinct disharmony between these two passages. It is to be noted also that the MSS here have the neuter παρήλιον; since Aratus also uses the neuter form (*Phaen.* 881), I suspect that an interpolator has here given us an abbreviated version of *Phaen.* 880-9:

σκέπτεο δ' ἢ ἀνιόντος ἢ αὐτίκα δυομένοιο,
εἴ που οἱ νεφέων τὰ παρήλια κυκλήσκονται
ἢ νότου ἢ βορῆος ἐρεύθεται ἢ ἐκάτερθεν,
μηδ' οὕτω σκοπιῇν ταύτην ἀμηνῆν φυλάσσειν.
οὐ γάρ, ὅτ' ἀμφοτέρωθεν ὁμοῦ περὶ μέσσον ἔχουσιν
ἡέλιον κεῖναι νεφέλαι σχεδὸν ὠκεανοῖο,
γίνεται ἀμβολίη διόθεν χειμῶνος ἰόντος.
εἴ γε μὲν ἐκ βορέαο μί' οἷη φοινίσσοιτο,
ἐκ βορέω πνοιᾶς κε φέροι, νοτίη δὲ νότοιο,
ἢ καὶ που ῥαθάμιγγες ἐπιτροχόωσ' ὑετοῖο.

The authenticity of this observation is further undermined by the fact that it is immediately preceded by an irrelevant reference to a characteristic of the north and south winds which ought also to be rejected: καὶ ὁ μὲν βορέας λήγων ἐλάττων

ὁ δὲ νότος ἀρχόμενος. Such a description should belong properly to 35-7.

30: ἡ πέμπτῃ καὶ δεκάτῃ ἀπὸ τροπῶν τῶν χειμερινῶν ὡς τὰ πολλὰ νότιος.

Elsewhere in ΠΣ when the interval between the observation of the weather sign and the occurrence of the predicted weather is specifically stated it is always three days (10, 11, 21, 46, reckoned inclusively).³³ The interval here is unique. Furthermore, as with the spurious παρήλιος observation in 29, to this statement too is attached an otiose reference to a characteristic of the north and south winds appropriate to 35-7: βορείων δὲ γινομένων ξηραίνει πάντα νοτίων δὲ ὑγραίνει. What we have in 30 may be a marginal note based on [Arist.] *Pr.* 941b14: ἔστι δὲ καὶ ἡ μετὰ τὰς χειμερινὰς τροπὰς πεντεκαίδεκάτῃ νότιος . . .

32: εἰάν ἀστραπὴ πανταχόθεν γίνηται, ὕδωρ σημαίνει, καὶ ὅθεν ἂν αἱ ἀστραπαὶ πυκναὶ γίνωνται, ἐντεῦθεν πνεύματα γίνονται.

i) ὕδωρ = NMI

ii) Repeats 21: ἀστραπαὶ δὲ εἰάν γε πανταχόθεν γένωνται, ὕδατος ἂν ἡ ἀνέμου σημεῖον, καὶ ἐσπερίναι ὡσαύτως. Here, because of the natural difficulty, already mentioned (p. 327), of segregating signs of rain from those of wind, the DIS (ὕδατος ἡ ἀνέμου) is acceptable. One may explain 32 as a marginal note based on 21. At first sight 32 seems to present more specific information and to be preferable, therefore, to 21, but the likelihood is that the phraseology which gives this impression (ὅθεν...ἐντεῦθεν) was prompted by that of the immediately succeeding sentence: θέρους ὅθεν ἂν ἀστραπαὶ καὶ βρονταὶ γίνωνται, ἐντεῦθεν πνεύματα γίνονται ἰσχυρά.

33: εἰάν νότου πνέοντος βορρᾶθεν ἀστράπτῃ, παύεται· εἰάν ἔωθεν ἀστράπτῃ εἴωθε παύεσθαι τριταῖος, οἱ δὲ ἄλλοι πεμπταῖοι ἐβδομαῖοι ἑνναταῖοι, οἱ δὲ δειλινοὶ ταχὺ παύονται. οἱ βορέαι παύονται ὡς ἐπὶ τὸ πολὺ ἐν περιτταῖς οἱ δὲ νότοι ἐν ἀρτίαις. ἄνεμοι αἴρονται ἅμ' ἡλίῳ ἀνατέλλοντι καὶ σελήνῃ. εἰάν ἀνατέλλον ὁ ἥλιος καὶ σελήνη παύσωσιν, ἐπιτείνει τὰ πνεύματα· χρονιώτερα δὲ καὶ ἰσχυρότερα τὰ πνεύματα γίνονται τὰ ἡμέρας ἢ νύκτωρ ἀρχόμενα.

i) παύεται (εἴωθε παύεσθαι, παύονται) = εὐδία = DMI: appropriate to chapter IV. Once again (as in 29 and 30) a passage which may be deemed to be interpolated is accompanied by a misplaced (and interpolated) description of the winds.

34: μύκητες ἐπὶ λύχνου νότιον πνεῦμα ἢ ὕδωρ σημαίνουσιν.

i) πνεῦμα ἢ ὕδωρ = DIS

ii) Being originally a marginal note, it repeats in abbreviated form 14: καὶ οἱ μύκητες εἰάν νότια ἢ, ὕδωρ σημαίνουσι, σημαίνουσι δὲ καὶ ἄνεμον κατὰ λόγον

³³ The importance of the three-day interval is stressed in 10, where the implication is that this is a maximum interval. Signs derived from the sunset may also relate, as in modern weather lore, to the weather of the next day (51).

332 Theophrastus

ὥς ἂν ἔχωσι πλήθους καὶ μεγέθους, σμικροὶ δὲ καὶ κεγχρώδεις καὶ λαμπροὶ ὕδωρ καὶ ἄνεμον.

Chapter III: Signs of Storm

39: (στρουθὸς ἂν λευκὸς ἢ χελιδὼν ἢ ἄλλο τι τῶν μὴ εἰωθότων λευκῶν, χειμῶνα μέγαν σημαίνουσιν), ὥσπερ καὶ μέλανες ἂν πολλοὶ φανῶσιν ὕδωρ.

The bracketed words are unobjectionable. (Brackets mine.)

ὕδωρ = NMI: appropriate to chapter I, especially 15 where χελιδόνες are mentioned. Moreover the meaning is by no means clear: to what does the epithet μέλανες refer? To στρουθός, χελιδὼν and οἱ μὴ εἰωθότες λευκοί together? To ὄρνιθες in general? Wimmer's translation does not clarify the matter: *sicut nigri cum copiosi apparuerunt pluviam*. If μέλανες may be taken as virtually synonymous with οἱ μὴ εἰωθότες λευκοί, the clause verges on the meaningless, as does Hort's translation: "even as the appearance of a large number of such birds of dark colour signifies rain." (Italics mine.)

40: φωνὴ ἐν λιμένι ἀποψοφοῦσα καὶ πολύπλοκον ἤχουσα χειμέριον.

φωνὴ ἐν λιμένι = PI: M in a Z-cluster. The interpolation here may have arisen from the fact that this M-observation is framed by two Z-observations connected with the sea: τευθίδες and πνεύμονες οἱ θαλάττιοι. (I strongly suspect textual corruption here—MSS: πολύποδον ἔχουσα; Schneider: πολύπλοκον ἔχουσα—and am inclined to substitute φώκη (Coray) for φωνή: thus not only could a clear meaning be given to the sentence but also homogeneity to the Z-cluster; the observation could be allowed to stand as genuine. It does not seem necessary to adopt the remainder of Coray's emendation: πολύποδες * * * ἔχουσα. For the purpose of this paper however I accept the text of Wimmer and Hort.)

41: ἐν δὲ τῷ Πόντῳ φασίν, ὅταν Ἀρκτοῦρος ἀνατείλῃ θᾶπτον, ἐναντίους τῷ βορρᾷ νέμεσθαι.

What we have here is not a weather sign but rather a piece of zoological lore. And what of θᾶπτον? For Hort it is "clearly corrupt"; it evoked no comment from Schneider but got an asterisk from Wimmer. The preceding sentence reads: μετοπῶρ ἂν πρόβατα ἢ βόες ὀρύττωσι καὶ κοιμῶνται ἀθροοὶ πρὸς ἀλλήλους ἔχοντες τὰς κεφαλὰς, τὸν χειμῶνα χειμέριον σημαίνει. This recalls Aratus, *Phaen.* 1082-5:

εἰ δὲ βόες καὶ μῆλα μετὰ βρίθουσιν ὀπώρην
γαῖαν ὀρύσσουσιν, κεφαλὰς δ' ἀνέμοιο βορῆος
ἀντία τείνωσιν, μάλα κεν τότε χειμέριον αὐταὶ
Πληϊάδες χειμῶνα κατερχόμεναι φορέοιεν.

I suggest that a clause similar to κεφαλὰς δ' ἀνέμοιο βορῆος ἀντία τείνωσιν has dropped out of the text of ΠΣ—some such clause as καὶ ἂν ἐπὶ Πλειάδος ἐναντίας τῷ βορρᾷ τείνωσιν τὰς κεφαλὰς (the repeated κεφαλὰς could have been

responsible)—and that a marginal note on this lost clause has found its way into the text. The marginal note would then mean: “In Pontus they say that the sheep or oxen graze (thus turning their heads) northward *earlier* than the setting (*i.e.* VCS, c. Nov. 5) of the Pleiades, *i.e.* when Arcturus rises at dawn (VHR, c. Sept. 20).³⁴

45: οἱ πρίνοι ἐὰν εὐκαρπῶσι, χειμῶνες πολλοὶ σφόδρα γίνονται.

i) πρίνοι = PI: B in a C(ii)-cluster.

ii) Repeated in 49, without disrupting a homogeneous cluster: οἱ πρίνοι ὅταν εὐκαρπῶσι σφόδρα, ὥς μὲν τὰ πολλὰ χειμῶνα ἰσχυρὸν σημαίνουσιν, ἐνίστε δὲ καὶ αὐχμούς φασι γίνεσθαι. (Since there is no chapter specifically devoted to signs of drought, the one which we find here, though very much an alien among signs of storm (αὐχμούς = DMI), may be allowed to stand).

49: καὶ ἐάν τις σπάλακα λαβὼν ὑποσπᾶσας ἄργιλον εἰς πιθάκην θῇ, σημαίνει ταῖς φωναῖς αἷς ἀφίησιν ἄνεμον καὶ εὐδίαν.

i) ἄνεμον = NMI: appropriate to chapter II.

ii) εὐδίαν = DMI: appropriate to chapter IV.

iii) The information provided here is uselessly vague, in that we are not told what kind of sounds from the mole indicate wind and what kind fine weather. As a guide, therefore, this sign serves no purpose, real or imagined, and in this respect would, if genuine, be unique in ΠΣ; furthermore, it would be unique in involving a device deliberately designed by man for weather prediction.

Chapter IV: Signs of Fine Weather

54: ἐπὶ δεξιὸν δὲ (*sc.* βοῦς καὶ κῶν κατακλινόμενοι) χειμῶνα (*sc.* σημαίνουσι).
χειμῶνα = DMI: appropriate to chapter III.

54: τέττιγες πολλοὶ γινόμενοι νοσῶδες τὸ ἔτος σημαίνουσι.

νοσῶδες τὸ ἔτος = DMI: of the four chapters of ΠΣ surely chapter IV provides the least fitting context for this weather sign—the term εὐδία would seem to exclude by definition the idea of sickness. This sign may have originated as a marginal note added by someone who was primarily interested in the relationship between the weather and health, a relationship which is frequently acknowledged in the Hippocratic writings, *e.g.* *De Aere Aquis et Locis* I-IX.

Signs derived from seasonal phenomena (= S) occur in chapters I, II and III. They appear to be spurious, for if they had come from our author, he would have placed them appropriately in section 56, which is introduced with the words: λέγεται δὲ καὶ τοιάδε σημεία ὅλων τε τῶν ἐνιαυτῶν γίνεσθαι καὶ τῶν μορίων.

The results of editing based on my theory of interpolation are set forth in Tables

³⁴ Aratus is probably here indebted to ΠΣ.

5-8, columns 1-6, from which we see that the pattern already discerned is reinforced: in each of the four chapters the greater part of the material is distributed into three distinct groups of predictive phenomena C(i), C(ii), and Z. Do these groups differ linguistically from one another and from the rest of the work?

The following examples illustrate the format in which signs in ΠΣ are almost invariably expressed: 13: καὶ ὅταν ἀνίσχοντος τοῦ ἡλίου αἱ αὐγαὶ οἷον ἐκλείποντος χρώμα ἴσχωσιν, ὕδατος σημεῖον, 15: καὶ φρύνη λουομένη καὶ βάτραχοι μᾶλλον ἄδοντες σημαίνουσιν ὕδωρ, 15: ἐὰν δὲ εἰς τὸν οὐρανὸν ἀνακύπτων ὁσφραίνεται, ὕδωρ σημαίνει. It has seemed worthwhile to examine the frequency of occurrence of the participle in this context and of the adverbs ἔαν and ὅταν. The results are set forth in Tables 5-8, columns 7-9.

The relatively high frequency of the participle in Z-clusters 15-19, 28-9, 38-42 and 52-5 is statistically significant and unquestionably distinguishes these not only from C(i)-clusters and C(ii)-clusters but also from the rest of the work: this frequency is not to be explained by the fact that animals and birds are living subjects, since Aratus, when dealing with zoological subjects, uses adverbs as frequently as the participle.³⁵ Furthermore, though my tables do not show this, nowhere in these Z-clusters is there a reference to the interval between the observation of a sign and the occurrence of the predicted weather, even though in the work as a whole there are twelve such references, including two with extra-cluster Z-signs (46).

I am convinced that these peculiarities are best explained by the hypothesis that these Z-clusters have been taken from a written source which had a special liking for the participle. To this source I am tempted to attribute the two small D-clusters 13-14 and 42, since these are juxtaposed to Z-clusters 15-19 and 38-42 respectively and since zoological and domestic phenomena of prediction, having the common characteristic of being terrestrial, might naturally have been treated together in a single work. The frequency of the participle in these D-clusters is probably adequate, statistically speaking, to justify their amalgamation with the Z-clusters. Let us call this written source Source X.

Zoological and domestic signs that occur apart from the clusters mentioned may be attributed to the author himself. For them he would have depended partly on his own experience (ἃ μὲν αὐτοὶ προσκοπήσαντες; section 1) and partly on popular oral lore, to which he acknowledges his indebtedness in sections 23 (τὸ δημόσιον . . . λεγόμενον), 25 (φασὶ δέ τινες) and 49 (τὸ πανταχοῦ δὲ λεγόμενον σημεῖον δημόσιον).

By a similar logic, and despite the absence of a supporting linguistic argument such as applied to Z-clusters, *i.e.* a predilection for the participle, the fact that C(ii)-signs are found (24, 37, 47, 53) apart from C(ii)-clusters leads me to posit a written source for the latter and to credit the author himself with all other C(ii)-signs.

Since C(i)-signs do not occur apart from clusters, the above explanation cannot

³⁵ He has 14 occurrences of each.

be applied to them. However, I find it hard to imagine the existence of a written source devoted exclusively to C(ii)-signs. It seems much more likely that such a source would have dealt with celestial signs in general and that we ought, therefore, to attribute the C(i)-clusters to it also. In it I envisage C(i)-signs as being segregated from C(ii)-signs. Let us call it Source Y.

As well as postulating the existence of two written sources for ΠΣ I would also venture to suggest that these sources had some pretension toward a quasi-scientific status, appropriate to Peripatetic works, since the only explanations of the connection between a sign and the weather it predicts that occur in ΠΣ are found in sections which I would attribute to these sources, *i.e.* 32 (Source Y), 41 and 52 (Source X).

We can now hypothesize our author's method of composition in relation to chapter I, identifying 4 stages in it:

1. Takes C(i)-signs from Source Y.
2. Takes D-signs and Z-signs from Source X.
3. Returns to Source Y for C(ii)-signs.
4. Draws on popular, oral lore and on his own experience.

His segregation of C(i)-signs from C(ii)-signs would have been due partly to the fact that they were already segregated in his source and partly to a desire for *variatio*, a stylistic principle recognised and practised by our author.³⁶ The same procedure can be seen in chapters III and IV, except that in the latter he completed his consultation of Source Y before turning to Source X. In chapter II he inserted the majority of his own observations not at the end, as in the other three chapters, but between Z-cluster 28-9 and C(ii)-cluster 31-4, perhaps because he wished to reserve the end of this chapter for his description of the winds (sections 35-7). (However, I am mystified as to why he should have segregated the M-signs of 29 from those of 31). All that can safely be said about the description of the winds is that it is indubitably Peripatetic, although on the whole it seems more closely related to Aristotle's *Meteorologica* 364b3-365a10 than to Theophrastus' *De Ventis* (*pace* Regenbogen *op. cit.*). As for the final three sections (55-7) they may safely be ascribed to the author himself.

III. CONCLUSION

ΠΣ was written by a member of the Lyceum who had recourse to a) two written sources, b) oral weather lore and c) his own experience. This hypothesis harmonises well with the opening words of the work. The text has suffered considerably from interpolation.

³⁶ Cf. *e.g.*, ἐσπεριναί (21), ἐσπέριαι (21), δείλης (23); ἔωθεν (19), ἀκρωρίας (21), ἔωθιναί (21); interchange of singular and plural, *e.g.* κόραξ, κόρακες (16).

Further support for our decision, already stated,³⁷ to exclude Aristotle as the author is provided in section 31: ἐὰν ἄκραι μετέωροι φαίνωνται ἢ καὶ νῆσοι ἐκ μιᾶς πλείους, νότιαν μεταβολὴν σημαίνει—an observation which, according to my argument, belongs to the author himself. In *Meteorologica* 373b10-12 Aristotle associates the optical illusion in question with the east wind and not the south. On the other hand, the following pieces of evidence support the attribution of Source X (D-clusters and Z-clusters) to Aristotle: a) The work of Aristotle to which Aelian, *NA* 7.7 acknowledges his indebtedness must have been concerned, in part at least, with zoological signs, and the same is true of the work of Aristotle to which the scholium on Aratus, *Phaen.* 1095 refers. b) There are two passages in ΠΣ, both attributable to Source X, for which Aristotle alone provides parallels: 13: ὥς δ' ἐπὶ τὸ πολὺ ἴρις περὶ λύχνον ἢ διὰ λύχνου διαφανομένη νότια σημαίνει ὕδατα (essentially the same idea is expressed in *Mete.* 374a20-1: περὶ γὰρ τούτους [*sc.* τοὺς λύχνους] τὰ πλεῖστα νοτίων ὄντων ἴρις γίνεται τοῦ χειμῶνος) and 30: ἐχίνος ὁ χειραῖος σημαντικόν· ποιεῖται δὲ δύο ὅπας ὅπου ἂν οἰκῇ, τὴν μὲν πρὸς βορρᾶν τὴν δὲ νοτόθεν· ὁποτέραν δ' ἂν ἀποφράττῃ, ἐντεῦθεν πνεῦμα σημαίνει, ἐὰν δ' ἀμφοτέρως, ἀνέμου μέγεθος (this has its correspondent in *Hist. An.* 612b4-8). Perhaps Source X may be identified with Aristotle's *Σημεῖα χειμῶνων* α' (Diog. Laert. 5.26) or with his *Σημασίαι χειμῶνων* (Hesychius of Miletus: p.14.99 Rose³).

As for Source Y, I would identify it with the *Περὶ σημείων* of Theophrastus mentioned by Proclus, since the sign from the planet Mercury that Proclus refers to the latter work is found virtually word for word in section 46, which on my hypothesis is to be attributed to Source Y. It is altogether likely that Theophrastus was familiar with Euctemon, whose influence on ΠΣ Rehm claimed to detect in passages (20, 22, 34, 43) which I see as having come from Source Y. It follows that Theophrastus cannot have been the author of our ΠΣ.³⁸

While the reference in section 4 to the 19-Year Cycle of Meton provides a certain *terminus post quem* (432 B.C.) for ΠΣ, no such conclusive clue exists for establishing a *terminus ante quem*. The author names only ten winds and seems to have been unaware of a duodecimal wind system.³⁹ Opinions differ as to when this system was invented. It has been attributed to Timosthenes of Rhodes (3rd century B.C.: *RE* VI A, col. 1314 ff., VIII A, col. 2351 ff.) and it has been argued that Aristotle knew it (*RE* VIII A, col. 2344ff.) At any rate, even if a date for its invention could be fixed, it would still not provide a reliable *terminus ante quem* for ΠΣ, because the system was never universally accepted. Since parallels in content and

³⁷ See the conclusion of the discussion of the Introduction.

³⁸ Supporting my belief that Theophrastus was not the author of ΠΣ is the fact that he (*Hist. Pl.* 7.13.6) makes the flowering of the σκίλλα rather than of the σχῖνος (ΠΣ 55) mark the season for sowing.

³⁹ λίψ (e.g. 20), βορέας (e.g. 29), νότιος (e.g. 29), θρακίας (e.g. 35), ἀργέστης (e.g. 35), εὖρος (e.g. 35), ἀπηλιώτης (e.g. 35), καικίας (e.g. 36), μέσης (e.g. 36), ζέφυρος (e.g. 36) [ἀπαρκτίας (35) = βορέας].

terminology between ΠΣ and Aratus can be explained by the assumption that either the latter borrowed from the former, or that both used the same sources, I am happy to date our author to *ca.* 300 B.C. and to see him as one of the lesser lights of the Peripatos. The fact that his aetiology of rain is probably the same as that of Theophrastus and that he mentions the observations made from Lepetymnos by the otherwise unknown Matriketas strongly suggests to me that he was a pupil of Theophrastus. During the third century B.C. ΠΣ probably reached Alexandria as an anonymous work, thus resembling other kinds of technical literature. Scholars then ascribed it to Aristotle or Theophrastus, because it contained obvious similarities to works on meteorology by these writers, especially the *Meteorologica* and the *De Ventis*. Once admitted to the highly esteemed corpus of Peripatetic literature, ΠΣ usurped a status which was not justified by its intrinsic value.

Table 1

Chapter I: as edited by Wimmer

1	2	3	4	5	6
Section	Number of Lines of Text	Type of Predictive Phenomenon	Frequency of Observation	Frequency of DIS	Frequency of MI
10 - 13	27	C(i)	20	2	3
13	2	πομόφυγες	1	--	--
13 - 14	9	D	7	1	--
15 - 19	34	Z	30	4	3
19	1	D	1	--	--
19	2	Z	2	1	--
20 - 22	22	C(ii)	18	5	1
22	3	Z	2	--	1
22 - 23	8	C(ii)	5	2	--
23	3	Z	3	1	--
24	4	C(ii)	2	--	--
24	2	S	2	--	1
24	1	C(ii)	1	--	1
25	4	D	3	1	2
25	2	Z	2	--	2

Table 2

Chapter II: as edited by Wimmer

1	2	3	4	5	6
Section	Number of Lines of Text	Type of Predictive Phenomenon	Frequency of Observation	Frequency of DIS	Frequency of MI
26 - 27	17	C(i)	14	3	3
28 - 29	8	Z	9	1	2
29	1	ἀράχνια	1	1	--
29	5	M	5	--	--
29 - 30	3	C(ii)	2	1	--
30	2	D	1	--	--
30	2	P	3	--	1
30	4	Z	2	--	--
31	4	M	5	--	--
31 - 33	24	C(ii)	12	--	3
34	3	S	2	--	1
34	6	C(ii)	8	1	--
34	1	D	1	1	--
35 - 37	Description of the Winds				
37	2	M	1	--	--
37	2	C(ii)	2	--	--

Table 3

Chapter III: as edited by Wimmer

1	2	3	4	5	6
Section	Number of Lines of Text	Type of Predictive Phenomenon	Frequency of Observation	Frequency of DIS	Frequency of MI
38	5	C(i)	2	--	--
38 - 40	17	Z	22	--	3
40	1	M	1	--	--
40 - 42	14	Z	16	--	1
42	7	D	7	--	2
43	11	C(ii)	10	--	1
44	9	S	7	--	7
45	1	B	1	--	--
45 - 46	9	C(ii)	6	--	2
46 - 47	9	Z	6	3	--
47	2	C(ii)	1	--	--
48	7	S	4	--	4
49	2	B	2	--	2
49	4	Z	2	--	2

Table 4

Chapter IV: as edited by Wimmer

1	2	3	4	5	6
Section	Number of Lines of Text	Type of Predictive Phenomenon	Frequency of Observation	Frequency of DIS	Frequency of MI
50 - 51	9	C(i)	7	--	--
51 - 52	9	C(ii)	9	--	--
52 - 53	11	Z	11	--	1
53	5	C(ii)	2	--	--
54	5	Z	6	--	3
54	3	D	3	--	--

Table 5

Chapter I: free from detectable interpolations

1	2	3	4	5	6	7	8	9
Section	Number of Lines of Text: Wimmer	Type of Predictive Phenomenon	Frequency of Observation	Frequency of DIS	Frequency of MI	Frequency of Participle	Frequency of ἑών	Frequency of ὄραν
10 - 13	25	C(i)	19	1	3	--	11	4
13 - 14	8	D	6	1	--	2	3	1
15 - 19	33	Z	29	5	--	15	11	2
20 - 23	30	C(ii)	23	7	1	1	10	3
23	3	Z	3	1	--	1	--	1
24	4	C(ii)	2	--	--	--	1	1
25	2	D	1	--	1	--	1	--

Table 6

Chapter II: free from detectable interpolations

1	2	3	4	5	6	7	8	9
Section	Number of Lines of Text: Wimmer	Type of Predictive Phenomenon	Frequency of Observation	Frequency of DIS	Frequency of MI	Frequency of Participle	Frequency of ἐάν	Frequency of ὅταν
26 - 27	15	C(i)	11	3	2	2	4	2
28 - 29	8	Z	9	1	2	7	--	--
29	1	ἀράχνια	1	1	--	1	--	--
29	5	M	5	--	--	3	2	--
30	2	D	1	--	--	--	1	--
30	2	P	3	--	1	1	1	--
30	4	Z	2	--	--	--	1	--
31	4	M	5	--	--	1	2	--
31 - 34	26	C(ii)	16	--	--	2	3	--
35-37	Description of the Winds							
37	2	M	1	--	--	--	1	--
37	2	C(ii)	2	--	--	--	1	--

Table 7

Chapter III: free from detectable interpolations

1	2	3	4	5	6	7	8	9
Section	Number of Lines of Text: Wimmer	Type of Predictive Phenomenon	Frequency of Observation	Frequency of DIS	Frequency of MI	Frequency of Participle	Frequency of εἰς	Frequency of ὅταν
38	5	C(i)	2	--	--	--	1	--
38 - 42	30	Z	37	--	3	16	9	--
42	7	D	7	--	2	2	5	--
43 - 46	20	C(ii)	16	--	3	2	9	1
46 - 47	9	Z	6	3	--	1	1	4
47	2	C(ii)	1	--	--	--	1	--
49	2	B	2	--	2	--	--	1
49	2	Z	1	--	--	--	--	1

Table 8

Chapter IV: free from detectable interpolations

1	2	3	4	5	6	7	8	9
Section	Number of Lines of Text: Wimmer	Type of Predictive Phenomenon	Frequency of Observation	Frequency of DIS	Frequency of MI	Frequency of Participle	Frequency of ἔαν	Frequency of ὅταν
50 - 51	9	C(i)	7	--	--	2	3	--
51 - 52	9	C(ii)	9	--	--	--	1	4
52 - 53	11	Z	11	--	1	6	1	1
53	5	C(ii)	2	--	--	--	1	1
54	3	Z	3	--	--	2	--	--
54	3	D	3	--	--	1	2	--



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11

Theophrastus: *On Fish*

Robert W. Sharples

INTRODUCTION

Theophrastus' short essay¹ *On Fish*—so at least the title in the MSS²—deals with exotic and unusual phenomena which are of interest in their own right; it also shows him trying to make sense of them in terms of Peripatetic theory.

The treatise is concerned with two related problems, that of fish which venture onto dry land and thus live in air (sections 1-6) and that of fish which burrow into the ground and survive there (sections 7-11; sections 10 and 12 consider both types). What both types of fish have in common is that they can exist without

¹ I take it that the text as we have it is essentially complete and self-contained (see further below), and I am persuaded by Allan Gotthelf that "treatise" is too portentous a title for a piece of this length. —The text and translation here published were originally prepared for Project Theophrastus before it was decided that that collection would not include texts of Theophrastus preserved in MSS in their own right. The Introduction and commentary are based on a paper given at the 1989 Eresos conference of the Project; I am grateful to all those who contributed comments on that occasion, and especially to Professor Gotthelf, the respondent to the paper. I have no claim to expertise in ichthyology, and I was well aware of the temerity involved in going to a Greek island in order to talk, as an outsider, about fish. —If it is not out of place for one who is very much an amateur in matters of ancient biology to do so, I would like to dedicate the present paper to the memory of Professor David Balme, whose death has been a grievous loss to the subject.

² The treatise is transmitted in MS Vat. gr. 1302 (Vat. gr. 1302 = Wimmer's A, Burnikel's 16; henceforth "A") and 11 other manuscripts ultimately dependent on it; cf. Burnikel, especially xxviii-xxxix, 73-91, 145 and 149, and the review by Wilson (references to these and all other works cited by author's name only will be found in the Bibliography at the end of this article). In the present paper I have made use of photographs of A provided by Project Theophrastus. Given the special position of A, and the fact that attempting a full collation of all the MSS would simply be to duplicate Burnikel's work already done though not yet published, I have not in my apparatus attempted to record those variant readings in other MSS that do happen to be mentioned in Burnikel's published work or in the other literature, except where they seem of particular interest. "Vulg." indicates readings incorporated without explicit comment in the edition of Schneider (and sometimes retained, against A, by himself in his fifth volume and by Wimmer). The absence of comment suggests that these readings came to Schneider as part of the established tradition.

the water which fish normally require for cooling. But before proceeding to examine what Theophrastus has to say about them, there are preliminary issues relating to the title and possible original context of the work.

On Fish seems to have been known by another name in antiquity; for passages from it are cited by Athenaeus under the titles *On (Creatures) That Spend Their Lives on Dry Land*³ and *On Living Creatures That Spend Time on Dry Land*⁴, and a title *On Creatures That Remain on Dry Land* appears in Diogenes Laertius' list of Theophrastean book-titles⁵. Such titles fit the text as we have it; but the discrepancy between the ancient references and the actual MSS raises two questions. Is the text as we have it substantially complete, or is it a fragment of a larger work that might as a whole have merited the wider title *On Fish*, that title having remained attached to our text even when the rest was lost? Or is the text we have rather a single section "On Fish" of what was once a work of wider scope about creatures found on land, including but not confined to fish?

I

There is no reference in Diogenes Laertius' list of Theophrastean titles to a work *On Fish* in general. Elsewhere there are some references to Theophrastus' views on fish that do not derive from our text as we have it, but many of these are either explicitly taken from other named treatises⁶ or can plausibly be supposed to derive from them.⁷ Steinmetz argues that two references in Seneca to subterranean fish come from our work,⁸ in which case our text would definitely not be complete;

³ Περὶ τῶν ἐν ξηρῷ διατρωμένων, Athenaeus 7.90 312B, citing section 4 of our treatise, on eels.

⁴ Περὶ τῶν ἐν ξηρῷ διατριβόντων ζῴων, Athenaeus 7.104 317F, again citing section 4, on octopuses; see Commentary on section 6.

⁵ Περὶ τῶν ἐν ξηρῷ διαμενόντων, Diogenes Laertius 5.43. As the details of Theophrastus' discussion show, "spend their lives" in Athenaeus' version of the title (above, n. 3) and "remain" here cannot be understood in the sense of "spend *all* their time on land", for none of the fish discussed by Theophrastus quite does that (some do spend all their lives *underground*; sections 9 and 11). The point must rather be that they spend more time on land than one would expect from a fish.

⁶ The change of colour of the octopus (Photius, *Bibl.* 278 525a33-6, Athenaeus 7.104 317F, cf. Plutarch, *Quaest. nat.* 19 916B) is taken from *On Creatures that Change Colour*, in Diogenes' list at 5.44; Athenaeus 3.65 105D and 7.95 314B from *On Creatures that Hibernates*, *ibid.*; Athenaeus 7.95 314C from *On Creatures that Bite and Sting*, *ibid.* See also the Commentary on section 6.

⁷ The tunny-fish, Athenaeus 7.63 301EF, derives from *On Creatures that Hibernates*; the fish in the springs of the Styx, Pliny 31.26, from *On Waters*. The reference to Theophrastus on large sea-beasts at Manuel Philes, *Anim. Prop.* 85 1532, is less easy to place.

⁸ Seneca *NQ* 3.16.5 (see Commentary on section 7), and 3.19.1-4 on hideous fish thrown up when waters burst from underground; the first passage names Theophrastus, the second does not. Steinmetz 244 n. 3 and 273.

but they could rather have come from the treatise *On Waters*. In the manuscripts of Theophrastus' work *On Odours* (sec.70), there is a misplaced reference to fish found in the Red Sea having grown inside stones. If this reference relates to *On Creatures That Remain on Dry Land*, it would indeed appear that our text is incomplete; but it may rather belong to *On Things Turned to Stone*.⁹ The part of the pseudo-Aristotelian *Mirabilia* (71-4) that corresponds to our treatise, and is clearly distinct from those that precede and follow it, contains no major points that are not included in our text.¹⁰

As for the internal evidence of the text itself, our text of *On Fish* is roughly the same length as *On Giddiness*; the text is damaged at the start,¹¹ but apart from that it could well be a complete and self-contained discussion of its two particular themes. It is easier, too, to suppose that the title *On Fish* in the manuscripts is the result of insufficient attention to the details of the treatise, or of the reluctance of scribes to copy out the whole of a title that virtually repeated the first sentence, than that Athenaeus and Diogenes both used a title suitable to part rather than the whole of a longer treatise. That would not be impossible, especially if a section was detached and circulated separately; but it is the existence of a longer treatise that needs to be demonstrated.

It is, however, striking that the ancient references give the title as *On Creatures That Remain on Dry Land* (the word "Creatures" being explicit in some cases and understood in others); they do not refer specifically to *fish* that remain on dry land.

⁹ Cf. Eichholz 14 n. 3, who argues that the passage derives either from *On Fish* or from *On Things Turned to Stone*, in order to claim that it does not come from *On Stones*, which would mean that the transmitted text of that work is incomplete. The title *On Things Turned to Stone* is itself problematic, depending on textual emendation in Diogenes' catalogue (5.42); but there is other evidence that Theophrastus wrote on the topic. Cf. Sollenberger at 17-18 and 47-8; Sharples, 1988B, at 43-4 and nn. The derivation of the passage in *On Odours* from *On Things Turned to Stone* might be easier if the fish in question were fossils. See Commentary on section 11. Steinmetz p. 306 n. 4 suggests that the reference may be to the living parts of live coral within the rocky skeleton.

¹⁰ What precedes at 68-70 can be related to Theophrastus' treatise *On Differences according to Place*; what follows at 75-7 to *On Creatures said to be Grudging*. On the legitimacy of arguments from the arrangement of the *Mirabilia* see Sharples, 1988B, at 42-3. The only addition in *Mirabilia* 71-4 as compared to our text is the reference to Rhegium (if that is the correct reading) in 73 (see Commentary on section 7) which could easily have been added by the compiler.

¹¹ The opening phrase, "The remaining of fish on dry land"—where the noun *diamonē* is used, as opposed to the verbs in the ancient title attestations—is immediately followed by "for it seems, as it were, contrary to nature that (creatures) should be cooled by air which do not take in air, and still more (that those should be) which take in moisture and are preserved by this". Schneider vol. 4 pp. 800 and 803 argued that the lacuna could be restored by "(is something) many wonder at" from the backward reference in "as we said" in section 3 below; but what is referred to there is the more specific topic of fish taking in both air and water through the same organs, mentioned by implication later in section 1 in connection with the *exōkoitos*, but not yet at the start of the section.

One might indeed ask, in the case of what other creatures would this behaviour be remarkable? To investigate this will involve something of a digression.

Our treatise is one of seven that appear in Diogenes Laertius' list of Theophrastean titles immediately before a reference to *On Living Creatures* in seven books. There has been much discussion as to whether the seven books of the latter are to be identified with the seven preceding titles.¹² But the aspect of that question that concerns us here is whether two passages that are specifically cited as from Theophrastus *On Living Creatures* can be related to any of the specific titles. If they cannot, the case for the identification of *On Living Creatures* with the seven preceding titles is weakened. Only the second of the two passages is directly relevant to the question of creatures remaining on dry land; but they need to be considered together in terms of their implications for the content of *On Living Creatures*.

Unfortunately the first passage provides very little illumination. It is found in Constantine Porphyrogenitus' compendium from Aristophanes of Byzantium's *Summary of Aristotle On Living Creatures*, together with other works.¹³ This cites Theophrastus as stating that Aristotle asserted the parthenogenesis of "the so-called Osiris" in the fifth book of *On Living Creatures* (where the title is presumably intended as a reference to Theophrastus' *On Living Creatures* rather than as an Aristotelian title). There is no such reference in the extant text of Aristotle. It is not clear to what Egyptian phenomenon or belief Theophrastus is supposed to be referring; each Egyptian pharaoh was believed to become identical with Osiris on death, but that does not seem to the point. Lambros himself (p.xiv) regards the present passage as from Aristophanes himself and as evidence of his learning and knowledge of Peripatetic works lost to us. A reference to an Egyptian belief

¹² Cf. Sharples (1988B) 61 n. 95, and other literature referred to there. The full list of detailed titles in Diogenes is: *On Differences of Voice in Creatures of the Same Kind*, *On <Creatures> That Appear in Swarms*, *On <Creatures> That Bite and Sting*, *On as Many Creatures as are said to be Grudging*, *On <Creatures> That Remain on Dry Land*, *On <Creatures> That Change Colour*, *On <Creatures> Which Retreat into Lairs* (i.e., hibernate).

¹³ "Aristophanes Byzantinus, *Hist. anim. epit.*" 1.98 (*Suppl. Arist.* vol. 1.1 29.19-21 Lambros); but this is in fact Constantine's compendium from Aristophanes' work, incorporating also material from Aelian and others (cf. Lambros' preface, ix-xv, and Cohn in Pauly-Wissowa, *RE* vol. 2.1 col. 1004). Aristophanes' work was already referred to as an "epitome" by John Lydus, *De magistratibus* 3.63 in the sixth century A.D. (cf. Slater pp. 141 ff.) But the "Hist." ("Research") in Lambros' title is strictly part of the title of Constantine's compendium, not of that of the original work by Aristophanes. The full title and subtitle are given in Lambros' text as follows:

Collection (*sullogē*) of research(es) on living creatures on land, with wings and in the sea, a labour of love by Constantine the great king and emperor: (subtitled) Aristophanes' Summary (*Epitomē*) of the (writings) of Aristotle on living creatures, with what was said by Aelian and Timotheus and certain others about each creature subjoined to it.

could only, one might suppose, have appeared in Aristotle or Theophrastus, or indeed in Aristophanes himself, as an illustrative aside to a more scientifically based discussion. Our text as it stands suggests that in the view of its author the Osiris is the *only* case of human parthenogenesis, but the text seems to be corrupt.¹⁴ Significantly enough, the other points about human reproduction in this context in Constantine-Aristophanes can be related to extant Peripatetic texts, as Lambros' apparatus shows, and are relatively orthodox in terms of Peripatetic doctrine; our passage is the exception.

The second passage is a reference in Athenaeus 9.37 387B to birds like the partridge that walk rather than fly, cited as from the third book of Theophrastus' *On Living Creatures*. The actual words that Athenaeus cites from Theophrastus begin, "Such a distinction applies to birds, too; for some of them are heavy and do not fly". "Such a distinction" does not refer back to anything preceding in Athenaeus' text, and must therefore relate to something in the text of Theophrastus. What could the distinction be that corresponded to that between birds that move through the air by flying and those that move across the land by walking? Conceivably, one between sea-creatures that move through the sea by swimming and those that move across the land by walking; and that might suggest that our text *On Fish* was indeed once part of a longer work, itself forming the third book of *On Living Creatures*, which discussed not only fish that were anomalously found on or under dry land, but also birds found on land rather than in the air.

There is a minor problem here, in that *On Creatures That Remain on Dry Land* is not the third but the fifth of the seven titles in Diogenes' list. Moreover, our extant text is once referred to by Athenaeus, according to the manuscripts, as "the fifth (book) *On Creatures That Spend Their Lives on Dry Land*".¹⁵ And our text

¹⁴ Professor Michael Reeve points out to me that the sentence at 29.19-20 Lambros is ungrammatical, and suggests that either *ton legomenon Osirin* should be deleted as a gloss (my colleague Alan Griffiths also pointed out the oddity of the repetition of the phrase "the so-called Osiris", *ton legomenon Osirin*, twice in three lines), or *kathaper* should be added before it. (If *ton legomenon Osirin* is deleted, *en Aiguptōi* should probably go with it). The instance of Osiris allegedly mentioned by Theophrastus will then be mentioned as an example to justify a more general claim; the train of thought in the whole passage seems to be that human beings are anomalous in being viviparous bipeds (29.18), and are like other bipeds, the birds, in that both produce without fertilisation—in the case of the birds unfertilised eggs (which of course do not hatch out live young), in the case of human beings live offspring parthenogenetically produced. *hupēnemion*, which in the case of birds means an unfertilised "wind-egg", is the term applied here to Osiris; see LSJ s.v. II.1. The phrase "the so-called Osiris" could perhaps be interpreted as expressing disbelief that the son of a human mother could be identified with a god. Mr. Griffiths points out that the *Apis-calf* was said to be born from a cow fertilised by a flash of light from heaven (Herodotus 3.28.2), but any connection between that and the passage in Aristophanes seems tenuous.

¹⁵ Athenaeus 7.90 312B (above, n. 3); Casaubon deleted the numeral "fifth", on the grounds that Diogenes Laertius' catalogue gives only one book to *On Creatures That Remain on Dry Land* itself, but the sense could be "*On Creatures That Remain on Dry Land*, the

is apparently a systematic discussion conceived throughout in terms of the question how fish out of water are cooled—land-animals being cooled by breathing in air, but fish normally by the water. There is no apparent connection between that issue and the fact that some birds remain on the ground and do not fly. So if the Athenaeus text on partridges did come from *On Creatures That Remain on Dry Land*, there would be questions about the thematic structure of that work as a whole. And, as my colleague Alan Griffiths points out to me, the reference to *dry land* (*xēron*) suggests contrast with water than with air.

It thus seems more likely that our text is after all a self-contained whole, and that the title *On Fish* in the manuscripts is simply careless, indicating neither that it is only part of a discussion of fish that was once fuller, nor yet that it is the section concerned with fish of a work that once covered other types of creature too. And then, unless the passage on partridges from the third book of *On Living Creatures*, and the apparent reference back that it contains, can be accommodated in *another* of the seven specific titles given by Diogenes, it seems difficult to continue to hold that the seven-book *On Living Creatures* can be wholly identified with the seven preceding titles in Diogenes. (The third title in Diogenes' list is *On Creatures that Bite and Sting*, which hardly seems very appropriate.)

II

Marine creatures that go on to land are one notable instance of creatures that, in Aristotle's technical terminology, dualize (*epamphoterizein*). There are however various ways of dualizing between land and water, for it is necessary to consider habitat and diet, and also anatomy and the means of cooling¹⁶. Aristotle at *Parts of Animals* 3.6 669a9 recognises animals that are cooled by the air that they breathe in but spend most of their lives in the water, and also water animals that are like land animals in that life for them depends on breathing. Although the two cases are distinct, the former relating to creatures like the hippopotamus¹⁷ and the latter to those like whales and dolphins, they have it in common that in both cases the creatures in question are creatures that breathe air; those that are water animals may indeed take in water, but they do so incidentally in the course of feeding.¹⁸

fifth book of *On Living Creatures*". Cf. Schweighäuser vol. 4 pp. 328-9, and Schneider vol. 4 p. 803.

¹⁶ On dualizing in general see Peck, 1965, lxiii-lxv. Aristotle's general theory of cooling by air or water is outlined at *Part. Anim.* 3.6 668b35 ff. and *De respiratione* 8 474b19 ff., 9 474b25 ff.

¹⁷ Aristotle at *HA* 8.2 589a27 states that it cannot live apart from water; see also *HA* 8.24 605a13.

¹⁸ Aristotle, *Respir.* 476b15-30 (of dolphins, and whales, which are cooled by air); *ibid.* 476b30-477a7 (of molluscs and crustaceans which do not need cooling at all.) Cf. also *HA* 8.2 589a16, and Commentary on section 4.

Theophrastus mentions such examples in section 1 of our treatise, referring to the dolphin, the seal and the *emus*.¹⁹ But he does so only in order to contrast this sort of dualizing with the cases with which he is primarily concerned here, dualizing in respect of the manner of cooling. Here two main types can be distinguished, if we confine ourselves for the moment to sections 1-6: (I) various types of fish that take in water for cooling, but come out onto the land and are there cooled by taking in air, and (II) water creatures that need relatively little cooling and so can survive for a time on land without actually taking in air, but simply being cooled by the air that surrounds them. These can be further subdivided into (IIa) those, like the octopus, which do not take in water for cooling even when they are in water, and (IIb) those like the eel that do take in water for cooling but do not take in much. Some of these do *also* dualize in respect of their food, food being their motive for coming out of the water; this Theophrastus regards in itself as less remarkable (section 3).²⁰

Where creatures of type (II) are concerned Theophrastus is following Aristotle, who at *De respiratione* 9 475b5 ff. states that bloodless water-animals, like crustacea and octopuses, remain alive longer in air than blooded ones like fishes, since they do not need so much cooling. But, Aristotle goes on, they cannot survive permanently, for most fishes also live in earth, though motionless, and are found by digging. The “for” seems odd, but the connection of thought is presumably that the difference between fish and bloodless creatures in respect of survival out of water is not as great as might seem—fish can survive for some time, and octopuses do not survive indefinitely.²¹ When Aristotle says that most fish (*hoi polloi*) live in earth, he may have in mind fish that burrow into the mud at the bottom of the sea or of rivers; at any rate, Theophrastus regards fish found by digging into earth that isn’t covered by water as remarkable enough to list examples of them in the second part of our treatise (sections 7-12; below, this paper, section IV). The fact that the passage in *De respiratione* mentions, though briefly, both water-creatures surviving in air and also fish found by digging might suggest that it prompted Theophrastus’ fuller discussion.

On the other hand, Aristotle does not have anything to say about specific examples of our type (I); for I take it that in referring to fish that survive out of water, but for less time than bloodless water-creatures, he has in mind rather ordinary fish that do not die immediately upon being caught and taken out of the water.

¹⁹ The seal is described as dualizing between land and water at Aristotle, *HA* 6.12 566b27; cf. *PA* 4.13 697b1. For the *emus* see below, Commentary on section 1.

²⁰ A tabulation of the types of creature discussed by Theophrastus in the text as a whole is given at the end of this Introduction and immediately before the Greek text of *Περὶ ἰχθύων*.

²¹ It is not, I think, an objection to this interpretation that Aristotle then concludes the chapter by restating his claim that there is a difference between fish that need to take in water for cooling and bloodless creatures that do not.

354 Theophrastus

Indeed, he elsewhere states that *no* animal that takes in sea-water gets its food from the land.²² It is clearly indicated by section 3 of Theophrastus' discussion, however, that there are fish in Babylonia which both take in water for cooling and find food on land.

Theophrastus mentions three cases of type (I): the *exōkoitos* or "sleeper-out", which is cooled alternatively by taking in water or taking in air; fish in India which come out on land; and fish in Babylonia which feed from threshing-floors.²³ Theophrastus does not explicitly state that the second and third cases involve taking in air for cooling, and the end of section 3 which mentions this could be taken as referring only to the *exōkoitos*. However Theophrastus' *explicit* reason for regarding the *exōkoitos* as more remarkable is that it spends longer on land, and the conclusion in section 12 refers in the plural to "some" fish that take in air for cooling. Moreover, at the end of section 3, after describing all three cases, Theophrastus says that what is remarkable is for something to be able to use the same organs to take in air and water, and the only one of the three cases in which he has actually mentioned organs of respiration at all, though not to say explicitly that they are used in both air and water, is not the *exōkoitos*, but the gills of the Babylonian fish.

III

In sections 3-4 Theophrastus gives examples of less extreme cases of dualizing. These include the hippopotamus, an animal that breathes air but finds its food in the water, and various creatures that normally dwell in water but sometimes come ashore without, in Theophrastus' view, taking in air. The octopus and the sea-eel (moray or murry: *muraina*, *smuraina*, *smuros*) come ashore for food (section 3), and the eel and crustacea are also said to come ashore (section 4). In the water these creatures are cooled either by taking in water or, in the case of octopuses and crustacea, just by the surrounding water; when they come on land they are cold enough to be able to survive simply by the cooling of the surrounding air, without actually taking in air for cooling.

The smallness of the eels' gills is cited in section 5 as showing that they do not need much moisture. That the eel does not need much cooling is further confirmed by section 10. At the end of section 4 Theophrastus indicates that similar considerations apply to the sea-eel and to other serpentine fish. Eels do in fact cross wet grass in order to ascend rivers from the sea; they absorb air through their skin.

²² Aristotle, *HA* 1.1 487b1; cf. *HA* 8.2 589a23, no animal that takes in water is footed or winged, or finds food on dry land. At *HA* 8.2 589b24, however, Aristotle—if it is he—allows that there are creatures which take in water and have gills, but go on dry land and get food there, though the only example he gives is the *kordulos* or newt (D'Arcy Thompson 127; Peck, 1965, lxxxii).

²³ For details of possible identifications of the creatures described, see the Commentary.

Theophrastus observes that these serpentine fish are less able to remain in water which is colder and less dense (which means, less salty), and that the octopus also avoids such water.²⁴ The implication is that creatures that do not need much cooling are already cool in themselves, and hence less able to tolerate cold water. The thesis (henceforth "[T]") of an inverse correlation between a creature's own temperature and the environment it can tolerate is further exemplified by the fact that sea-creatures go up rivers to spawn.²⁵ For, Theophrastus argues, the warmth of the sea (relative to fresh water) is shown by the fact that sea-creatures can tolerate fresh water, but not vice versa. The implication is that the sea is too warm for the fresh-water creatures, which are hotter in themselves and so require more cooling.

So far Theophrastus has been concerned with the effects of warmer or colder water. But he now continues by saying that one should perhaps consider first whether air or 'the moist' is warmer. It should be air, he says, because it is closer to fire; but that, he claims, would imply that creatures surrounded by air will always be less warm than those that live in water. It will do so, clearly, on the basis of the same assumption [T] that what is cooler in itself is more able to tolerate warmer surroundings which provide less cooling. But, as Theophrastus then points out, while this may account for cold creatures like eels and octopuses being able to survive out of water,²⁶ it will conflict with the general opinion that viviparous blooded animals are the warmest. Such animals typically live on land surrounded and cooled by air; since they get less cooling from warm air than from cold water, [T] would imply that they are colder in themselves. Theophrastus then sets the question aside for further consideration.

At *De respiratione* 14 477a32 ff., Aristotle argues against Empedocles' claim that water creatures are warmer in themselves than land-creatures,²⁷ saying that whether a creature lives on land or in the water is to be explained in terms of the balance of moist and dry in its natural constitution, and not simply in terms of its warmth or coldness. Aristotle does not reject the claim that higher animals (which will typically mean: viviparous blooded ones²⁸) are warmer; indeed, he expressly asserts it at *De respiratione* 13 477a15. His objection is to the simple correlation of the intrinsic warmth or coolness of creatures with a water or land habitat. But that throws doubt on principle [T].

It may however still be possible to use [T] in the way that Theophrastus has so far used it, to explain why some water creatures find some water less amenable,

²⁴ That this is the general sense of the passage is clear; on the details, some of which are problematic, see the Commentary.

²⁵ They do so, he says, because they are less disturbed by waves and winds there and less exposed to predators.

²⁶ I take this to be the sense of "even if this is not opposed to what [we] are now [saying]". See further the Commentary on section 6.

²⁷ I am grateful to James Longrigg for drawing my attention to this passage.

²⁸ Aristotle, *Gen. Anim.* 2.1 732b32 ff. Peck, 1965, xii-xiii.

and also why some water creatures are able to survive for a time on land without breathing, without committing oneself to the claim that [T] can be used to give an account of the habitat on land or in water of creatures in general. This would fit with the fact that Theophrastus first uses the principle in a restricted group of contexts, and only afterwards raises difficulties about its more general application. The words "even if this is not opposed to what (we) are now (saying)" in section 6 will not constitute the raising of a real difficulty about what has been said so far, but will rather be preliminary to the raising of the difficulty about land-animals in general which results from a too general application of [T].

IV

The second part of the treatise is concerned with fish that are dug out of the earth. The existence of these raises two questions; where they come from, and how they survive outside the normal watery environment of a fish. The second point provides the connection between these and the fish discussed in the first part of the treatise; the two types are clearly distinguished, however, at the start of section 10.²⁹ A number of different reasons for fish being found in the earth are mentioned; some fish (type III) burrow into the beds of rivers and water-meadows as these dry up in summer, and survive there until the water returns (section 7); others (IV) are actually generated underground, either from eggs or from generative principles of some type. Eggs or generative principles can be left behind by retreating moisture (IVa and IVb, sections 8 and 9) or, in the case of the generative principles, be brought by moisture percolating from elsewhere or simply occur in the earth (IVc and IVd, section 11).

First, in section 7, Theophrastus mentions fish that burrow into the land beside rivers as the rivers dry up, pursuing the remaining moisture; they are preserved in the moisture like hibernating creatures³⁰, but move when they are dug up. They are found, he says, in the region of Heraclea and elsewhere around the Black Sea. To these he compares fish in the Black Sea, notably gobies, that are caught in the ice and frozen solid without sensation and movement, but regain these when boiled. It might seem less surprising to find fish in ice than in earth; the point of similarity is that both are alike in that they are both in a state of suspended animation. Section 12 points out that both these types, at any rate, have water as their natural proper element.

So far the fish found underground are fish that have burrowed down there to escape drought. At the end of section 8, however, Theophrastus says that most cases of fish that are dug up are to be explained by rivers which flood and then subside, leaving behind in the dry ground either eggs (IVa) or principles from which

²⁹ Though Pliny conflates them; below, Commentary on section 10.

³⁰ On which Theophrastus wrote a special treatise; above, nn. 6, 12.

the fish are generated (IVb). These fish remain underground, since like hibernating creatures they do not need much nourishment, and they get what they need from the eggs and the moisture in the earth; but they lack both the nourishment and the space to grow to a large size. The argument is obscured by the introduction of what is apparently a parenthetical reference to fish that are spontaneously generated, but *not* found underground;³¹ but the general sense is clear. Finally in section 11 Theophrastus refers to a special case, that of fish dug up in Paphlagonia from places that are not periodically flooded, and which must therefore be explained by spontaneous generation from moisture present in the place or percolating underground.

In section 12 Theophrastus draws the threads together by considering whether water is in fact the natural element both for the fish that go on to dry land and for those that are dug up. If they were placed in water, would they survive there or seek some other natural place? Water clearly is the natural element for those that burrow underground to escape drought and for those caught in the ice (that is, those of type III mentioned in sections 7 and 8). He goes on to say that it is reasonable that this should apply also to those that are dug up and to "the others"; the details will be discussed in the Commentary, but the suggestion seems to be that water is the natural element simply for fish of type (IV) that are dug up, and that "the others" with a "double way of life" are the creatures of type (II) that come ashore without breathing in air, with which Theophrastus in concluding couples the fish of type (I) that use air for cooling.

V

The question arises how we are to relate this text to Peripatetic procedure in biological enquiry.³² Is it primarily concerned with explanation, with showing how Peripatetic theories can cope with strange phenomena? Or does it represent a much earlier stage of investigation, the sifting of reports to see which should be considered in the construction of explanatory theories? Such sifting must however, if it takes place at all, be based on one or more of the following considerations: the credibility of reporters—an issue not explicitly mentioned in this treatise; commonplace ideas about living creatures (fish belong in the water); or Peripatetic theories (fish need water for cooling). But in so far as Peripatetic theories enter into the sifting, the distinction between a preliminary stage of sifting and a subsequent phase where theories are constructed becomes harder to pin down.

Comparison with *Progression of Animals* is illuminating here.³³ That treatise

³¹ See below, commentary on section 9.

³² I am grateful to Allan Gotthelf for raising this question in his comments on the paper delivered at Eresos.

³³ Here again Professor Gotthelf's comments have helped me.

can be more purely theoretical because it builds on the anatomical theories of *Parts of Animals*, which is itself already a work of theory when compared to the *Historia Animalium*. What is missing from our text—and comparison with the *modern* literature on fish out of water cited in the Commentary, below, makes this particularly striking—is detailed discussion of the anatomy of the fish concerned in relation to their mode of cooling. All we have is a few references to possession or size of gills. No doubt this is because the more anatomically remarkable cases were not available for detailed examination; but it means that our text lacks the sort of theoretical basis that *Progression of Animals* has. Or, putting it another way, *Progression of Animals* deals with all types of animals, including many that can be easily observed and examined; our text concerns itself from the outset with cases that seem anomalous, and tries to relate them to a general theory of cooling already derived from other less anomalous examples. So we have theory—yes; but the question of the extent to which that theory can be applied is, not uncharacteristically, left unanswered.³⁴

As for sifting, the first part of our text is concerned to rank reports in terms of their *strangeness* in relation to Aristotelian theory, but it does not explicitly and consistently correlate strangeness and incredibility. No distinction is drawn between the Indian and the Babylonian fish in respect of *strangeness*; and yet “they say” is applied to the Babylonian fish, but not to the Indian. The second half of the treatise is less concerned with strangeness, and presents its reports as factual rather than as hearsay; that may be because fish under the ground where there is moisture are less anomalous than fish on dry land. But Theophrastus does end by apparently accepting *all* the types of case that he has described, and treating them all as admitting of reasonable explanation. He is not concerned to use his examples to support a theory which will then be applied more generally; on the contrary, he brings the theory ready-made to the examples.

Theophrastus’ treatise *On Fish* is hardly a major work. But it does show Theophrastus endeavouring to make sense, within the terms of his own theories, of occurrences or reported occurrences which must have seemed as bizarre to him as they do to the layman today; and this, I would suggest, is where its interest lies.

TYPES OF FISH DISCUSSED IN THE TREATISE

Sea creatures on dry land:

- I Fish, cooled by water in the sea, which come out on to land and are there cooled by taking in air (sections 1-3).

³⁴ See above at the end of section III. One is reminded of Theophrastus’ turning aside from general questions about the nature of fire to more specific issues, at *De igne* 10.

- II Sea creatures that do not need much cooling and so can survive on land without taking in air (sections 4-6): divided into
 - IIa Those that do not take in water for cooling in the sea either;
 - IIb Those that do take in water for cooling when in the sea, but not much.

Fish found in the earth:

- III Fish that burrow into the ground to escape drought (section 7).
- IV Fish generated underground and remaining there:
 - IVa From eggs left by retreating moisture (sections 8-9);
 - IVb From generative principles left by retreating moisture (sections 8-9);
 - IVc From generative principles brought by percolating moisture; or
 - IVd From generative principles occurring naturally in the earth (section 11).

ΘΕΟΦΡΑΣΤΟΥ ΠΕΡΙ ΙΧΘΥΩΝ

- 1 τῆς τῶν ἰχθύων ἐν τῷ ξηρῷ διαμονῆς ... δοκεῖ γὰρ οἶον παρὰ φύσιν
τῷ ἀέρι καταψύχεσθαι τὰ μὴ δεχόμενα τὸν ἀέρα (καὶ) μᾶλλον ὅσα δέχεται
τὸ ὑγρὸν καὶ διὰ τοῦτο σώζεται. θαυμασιώτατον δέ, εἴτερ ἀληθές, τὸ τοῦ
ἐξωκοίτου καλουμένου· τοῦτον γάρ φασιν ὅσημέραι ποιεῖσθαι τὴν κοίτην
ἐν τῇ γῇ, διὸ καὶ τοῦνομα εἰληφέναι. φαίνεται δ' οὖν, εἴτερ δύναται δρᾶν, 5
ἐπαμφοτερίζειν, οὐ τῇ τροφῇ καὶ τῇ διαγωγῇ καθάπερ ἡ φώκη καὶ ἐμὺς
καὶ ἕτερ' ἄττα, καὶ τῶν ὀρνίθων δὲ πολλοί, ἀλλὰ καὶ τῷ δέχεσθαι καὶ
τὸν ἀέρα καὶ τὴν θάλατταν, οὐχ οὕτως ὥσπερ ὁ δελφίς καὶ ἕτερ' ἄττα,
φύσει μὲν [οὖν] ὄντα ἀναπνευστικὰ καὶ τὴν θάλατταν δεχόμενα καὶ
ἀναφυσῶντα πρὸς τὴν χρεῖαν, ἀλλ' ἀμφοτέρω πρὸς τὴν τοῦ ζῆν διαμονήν. 10
ἄτοπος δ' ἂν (αὐ)τοῖς ἡ φύσις καὶ ἡ δύναμις εἴη.
- 2 τὰ δ' ἐν Ἰνδοῖς ἰχθύδια τὰ ἐκ τῶν ποταμῶν εἰς τὴν γῆν ἐξιόντα καὶ
πηδῶντα καὶ πάλιν εἰς τὸ ὕδωρ ἀπιόντα, καθάπερ οἱ βάτραχοι, θαυμαστὰ
μὲν οὖν, οὐχ ὁμοίως δὲ τοῦτοις, ὥσω τὸ ὀλίγον χρόνον ἢ πολὺν καὶ
τελευταῖον ἦττον θαυμαστόν· ἡ δ' ὅψις ὁμοία τούτων τοῖς μαζίναις 15
καλουμένοις.
- εἰσὶ δὲ καὶ περὶ Βαβυλωνά τινες, οὓς φασὶ διαμένειν ἐν ταῖς τρώγλαις
ταῖς ἐχούσαις ὑγρότητα ξηραίνομένου τοῦ ποταμοῦ· τούτους δ' ἐξιόντας
(ἐπὶ τὰς ἄλως) νέμεσθαι (καὶ) βαδίζειν ἐπὶ τῶν πτερυγίων καὶ ἅμα κινεῖν
τὴν οὐρὰν, καὶ ὅταν διώκωνται φεύγειν καὶ εἰσδύντας ἀντιπροσώπους 20
ἴστασθαι· πολλάκις γὰρ προσιέναι τινὰς καὶ ἐρεθίζειν. ἔχουσι δὲ τὴν μὲν
κεφαλὴν ὁμοίαν βατράχῳ θαλαττίῳ τὸ δ' ἄλλο σῶμα κωβιῷ βράγχια δὲ

sigla: A (= no.16 Burnikel) *Vaticanus graecus 1302*; D (= no.17) *Vaticanus Urbanus graecus 108*; L (= no.18) *Leidensis Vossianus graecus Q 25*; Ald. (= no.22) *Editio Aldina, vol.3 (Venice 1497)*

ubi Theophrastus in relationibus nominatur, hoc expressis verbis indicatur; alibi Theophrastum non nominatum intellegas

3-5 *Clearchus, fr.101 Wehrli ap. Athenaeum, Deipnos. 8 332CE; Oppianus, Halieutica 1.155-67; Aelianus, De nat. an. 9.36; Manuel Philes, De animalium proprietate 114 (98) 1919-1944 (p.46 Dübner, qui tamen haec verba seclisuit) 12-13 Plinius, Nat. hist. 9.71 12-16 Athenaeus, Deipnos. 8.4 332B, Theophrasto nominato; [Aristoteles] Mirabilia 71 835b5-7 17-18 Aelianus, De nat. an. 5.2, Theophrasto nominato 17-24 Plinius, Nat. hist. 9.175, Theophrasto nominato; [Aristoteles], Mirabilia 72 835b7-14; Albertus Magnus, De animalibus 24.22 (p.1522.11-16 Stadler), Theophrasto nominato*

1 ἡ ... διαμονή D post corr. lacunam ind. Schneider 2 καὶ add. Schneider 6 ἐμὺς Wimmer : ἡ ἐμὺς Schneider : ἡ μῦς A 9 οὖν del. Schneider 11 ἂν αὐτοῖς Wimmer : ἂν τοῖς A : αὐτοῖς Ald. 17 τρώγλαις Furlanus ex [Aristotele] : στρογγύλαις A 19 ἐπὶ τὰς ἄλως add. Schneider ex [Aristotele] καὶ Ald., et [Aristoteles] : om. A

THEOPHRASTUS, *ON FISH*

- 1 The remaining of fish on dry land ... for it seems, as it were, contrary to nature that (creatures) should be cooled by air which do not take in air, and still more (that those should be) which take in moisture and are preserved by this. Most remarkable, if it be true, is the case of what is called the 'sleeper-out', for they say that this every day makes its bed on the land, and this is why it has received the name. It seems, then, if it can do (this), that it lives a double life; not with regard to its food and its way of life like the seal and the turtle and some other (creatures), and many birds, but also in taking in both air and sea-water—(and) not like the dolphin and some other (creatures), which naturally breathe air and take in sea-water and blow it out again through necessity, but (rather taking in both) in order to preserve its life. Strange would be the nature and capacity belonging to these (the 'sleepers-out').
- 2 The little fish in India which come out of the rivers onto the land and jump about and go back into the water again, like frogs, are indeed remarkable, but not in the same way as these, inasmuch as (spending) a little time (on land) is, in the end, less remarkable than (spending) much time. These look like what are called *mazinai*.

There are certain fish in the region of Babylon which they say remain in holes that contain moisture when the river dries up. These come out and feed on the threshing-floors and walk on their fins, at the same time moving their tails. When they are pursued they run away and diving (into their holes) take their stand facing outwards; for people often come up and provoke them. Their head is like that of a sea-angler, the rest of their body like that of

- ὥσπερ καὶ οἱ ἄλλοι ἰχθύες· ὅτι δ' οὐ πόδας ἔχουσιν ἀλλ' ἐπὶ τῶν πτερυγίων
 βαδίζουσι τεθεώρηται· ἐλάμβανον γὰρ πολλοὺς οἱ διώκοντες· τὰ δὲ
 3 πτερύγια εὐμεγέθη. τὸ δ' ἐκ τῆς γῆς τὴν τροφήν λαμβάνειν οὐκ ἄτοπον· 25
 ἔνιοι γὰρ καὶ ἐν τῷ ὑγρῷ ὄντες πληλὺν ἐσθίουσι καὶ φύκος καὶ τὰ τοιαῦτα.
 καὶ ὅλως δὲ εἴπερ ἐν τῷ ἀέρι διαγίνονται καὶ τὸ τῆς τροφῆς οὐκ ἄλογον·
 ἐπεὶ καὶ ὁ πολύπους ἐξίων λαμβάνει καὶ ἡ μύραινα καὶ ἄλλοι δὲ ὥς φασι.
 καὶ τὸ ὅλον οὐκ ἄλογον, ὥσπερ τῶν πεζῶν καὶ πτηνῶν ἔνια ταῖς
 ἐνύδροις χρήται, καὶ τὰ ἐνυδρα ταῖς ἐν τῇ γῇ καὶ τὴν φύσιν ὁμοίως 30
 ἀνταποδιδόναι τὸ ἀνάλογον. φαίνεται δὲ καὶ ὁ ἵππος ὁ ποτάμιος τοιοῦτον.
 ἀλλ' ἐκεῖνο θαυμαστόν, ὥσπερ εἵπομεν, εἴ τι δύναται τοῖς αὐτοῖς μορίοις
 [ὥς] ὀργανικοῖς ὅτε μὲν ἐπισπᾶσθαι τὸν ἀέρα καὶ ἔλκειν ὅτε δὲ τὸ ὑγρὸν
 δέχεσθαι. τάχα δὲ τούτου μᾶλλον, εἰ ὅτε μὲν ὁ ἀήρ σύμμετρος πρὸς τὴν
 κατάψυξιν ἢ ὅτιδήποτε ἐστὶν ἐκ τῆς ἀναπνοῆς γινόμενον, ὅτε δὲ τὸ ὑγρὸν· 35
 οὐ γὰρ ἄμα γ' ἄμφω.
 4 τὸ δὲ τῶν πολυπόδων ἦττον θαυμαστόν· οὐ γὰρ δέχονται τὴν θάλατταν·
 καὶ οἱ κάραβοι καὶ οἱ ἀστακοὶ καὶ οἱ καρκίνοι καὶ τὰλλα τὰ τοιαῦτα,
 ὥστε μὴ μεγάλης ἄγαν τῆς μεταβολῆς οὐσης ῥᾶον ὑπομένειν. ὃ καὶ περὶ
 τὰς ἐγγέλους φαίνεται συμβαίνειν· πολὺν γὰρ χρόνον δύναται ζῆν ἔξω 40
 τοῦ ὑγροῦ διὰ τὸ μικρὰ τὰ βράγχια ἔχειν καὶ ὀλίγον δέχεσθαι τὸ ὑγρὸν·
 καὶ τὴν μύραιναν καὶ εἴ τι ἄλλο τοιοῦτον, ἢ καὶ τὸ ὅλον ὀφιδῶδες, ἥκιστα
 5 ἄτοπον. εὐλογον δὲ καὶ ἐν τῷ ὕδατι μὴ δύνασθαι διαμένειν ὅσῳ λεπτότερον
 ὢν τῆς θαλάσσης ἐγγυτέρω τοῦ ἀέρος ἐστὶ, καὶ ὅτι φύσει γε ψυχρότερόν
 ἐστὶ, διὸ καὶ πολύπους φεύγει. καὶ διὰ τοῦτο περὶ Ἑλλήσποντον καὶ τὸν 45
 Πόντον οὐκ ἔστιν.
 οἱ δ' ἰχθύες τίκτουσιν ἀναπλέοντες εἰς τοὺς ποταμοὺς καὶ τὰς λίμνας
 ὅτι εὐδία μᾶλλον κυμάτων καὶ πνευμάτων· καὶ τὰ θηρία ἐλάττω καὶ οἱ
 6 κατεσθίνοντες ὅλως καὶ διαφθείροντες ἰχθύς· ἡ δὲ τῆς θαλάττης θερμότης
 ἐξ ἐκείνου φανερά τῷ μὴ διαμένειν δύνασθαι ἐν αὐτῇ τὰ ἐκ τῶν ποταμῶν 50
 ἀλλὰ μᾶλλον τὰ ἐκ τῆς θαλάττης ἐν τοῖς ποταμοῖς καὶ ταῖς λίμναις. ἴσως
 δ' αὐτὸ τοῦτο πρότερον σκεπτέον πότερον θερμότερον ὁ ἀήρ ἢ τὸ ὑγρὸν·

28 Aristoteles, *Hist. anim.* 9.37 622a31; Clearchus fr. 102 Wehrli ap. Athenaeum, *Deipnos.* 7.103 317C; Oppianus, *Halieutica* 1.307-11, 4.264-307; Aelianus, *De nat. anim.* 9.45 37 Athenaeus, *Deipnos.* 7.104 317F, *Theophrasto nominato* 39-43 Athenaeus, *Deipnos.* 7.90 312B, *Theophrasto nominato* 45-6 Athenaeus, *Deipnos.* 7.104 317F, *sed ex alio Theophrasti opere* 47-9 Plinius, *Nat. hist.* 9.71

25 ἄτοπον A : ἄλογον *vulg.* 27 διαγίνονται *Wimmer* : διαγένηται A : διαγίνεται *Schneider vol.5* 28 ἄλλοι *Furlanus* : ἄλλοιοι A 33 ὥς *del. Wimmer* 42 ἢ *del. Schneider* : τοιοῦτον ἰχθύων γένος οἷον ὀφιδῶδες *coni. Wimmer* 44 καὶ ὅτι φύσει *Wimmer, ex Furlani versione Latina ut videtur* : καὶ τὸ φύσει A : καὶ τὸ ὕδωρ φύσει *Schneider vol.4* 47 δ' *sic A* 50 τῷ] τοῦ *Schneider vol.4*

a goby, and their gills like those of other fish. It has been observed that they do not have feet but walk on their fins; for the pursuers catch many
 3 of them. Their fins are of good size. That they should take their nourishment from the land is not strange; for some (fish) even though they are in the water eat mud and seaweed and things like that. And in general, seeing that they spend time in the air (out of the water) their way of feeding is not unreasonable; for the octopus too comes out of the water to take (its food), and the sea-eel, and others too, as they say.

And speaking generally it is not unreasonable that, just as some footed and winged creatures use (nourishment) from water, so water creatures (should use nourishment) from land, and nature should preserve the reciprocal correspondence. The hippopotamus, too, seems to be a case like this. But what *is* remarkable, as we said, is that something should be able, with the same organs, at one time to draw in and take in air, and at another time to take in moisture. And perhaps more (remarkable) than this is that at one time air should be suitable for the cooling, or whatever it is that is the effect of respiration, but at another moisture; for they are not both (responsible) simultaneously.

4 The case of octopuses is less remarkable, for they do not take in sea-water; and so too with crayfish and lobsters and crabs and others like them, so that the change (from sea to land) is not excessively great and they endure it more easily. And this seems to happen in the case of eels too; for they can live for a long time out of the moist element, because they have small gills and do not take in much moisture. And it is not at all strange that this should apply to the sea-eel, and anything else that is of this sort or in
 5 general serpent-like. It is also reasonable that (the eel) should be less able to remain in water, in as much as (the water) is thinner than sea-water and closer to air in consistency, and also on account of the water (in question) being naturally colder—for which reason the octopus, too, avoids it. And for this reason it does not occur in the region of the Hellespont and the Black Sea.

Fish swim up into the rivers and lakes to spawn because these are less disturbed by waves and winds; and there are fewer savage creatures, and in
 6 general fewer of those that eat and destroy fish. The warmth of the sea is clear from the fact that (creatures) from the rivers cannot remain in it, while on the other hand those from the sea (can remain) in the rivers and marshes. But perhaps one should consider *this* question first, namely, whether the air or the moist (element) is warmer; for if it is the air, as it would seem to

εἰ γὰρ ὁ ἀήρ ὥσπερ ἂν δόξειεν, ἐγγυτέρω γ' ὢν τοῦ πυρὸς, ἦττον αἰεὶ θερμὰ
τὰ τούτῳ κατεχόμενα. τοῦτο δὲ εἰ μὴ καὶ πρὸς τὰ νῦν ὑπεναντίον ἀλλὰ 55
πρὸς ἐκείνην τὴν δόξαν τὴν λεγομένην ὅτι θερμότατα πάντων τὰ ἔναιμα
καὶ ζωτόκα. περὶ μὲν οὖν τούτων ἐπισκεπτέον.

- 7 οἱ δ' ὀρυκτοὶ τῶν ἰχθύων—εἰσὶ γὰρ ἐνιαχοῦ καὶ τοιοῦτοι καθάπερ [γὰρ]
καὶ περὶ Ἡράκλειαν καὶ ἄλλοθι τῶν ἐν τῷ Πόντῳ—γίνονται μὲν καὶ παρὰ
τοὺς ποταμοὺς καὶ τὰ ἔνυδρα χωράφια. συμβαίνει δ' ἀναξηραιομένων 60
τούτων ἐγκαταλειπομένους κατὰ μικρὸν συστέλλεσθαι καὶ διώκοντας τὴν
ὕγρότητα δύεσθαι κατὰ τῆς γῆς, εἴτα καταξηραιομένης διαμένειν, ἐν τῇ
ἰκμάδι καθαπερανεὶ ταριχευομένους, ἐν τῇ γῇ, ὥσπερ τοὺς ἐν ταῖς φωλείαις
διαρκοῦντας· ὅταν δ' ἀνασκάπτωνται τότε κινεῖσθαι. παραπλήσιον δ' ἐστὶ
8 τούτῳ καὶ (τὸ) ἐπὶ τῶν ἐκπηγνυμένων ἐν τῷ Πόντῳ ὅταν περιλαμβάνονται 65
τῷ κρυστάλλῳ· οἱ οὐ πρότερον αἰσθάνονται καὶ κινεῖνται πρὶν εἰς τὰς
λοπάδας ἐμβληθῆναι καὶ ἔψεσθαι· πάντων δὲ μάλιστα δοκεῖ πάσχειν τοῦθ'
ὁ κωβιός.

- ὅλως δ' οἱ ὀρυκτοὶ γίνονται ἰχθύες διὰ τὸ ὑπερβάλλοντας τοὺς
ποταμοὺς ὅταν πάλιν εἰς τὸ ἀρχαῖον καθιστῶνται ρεῖθρον ἐγκαταλείπειν 70
ἐν τοῖς ἀναξηραιομένοις ἔνθα μὲν ὡς ἔνθα δὲ τοιαύτας ἀρχὰς ἐξ ὧν ἡ
9 γένεσις—ἕνια γὰρ οὐκ ἐκ ζώων ὥσπερ ἡ ἔγχελυς· δοκεῖ δ' οὕτως γίνεσθαι
καὶ ὁ καλούμενος κεστρινίσκος—ὥσπερ καὶ ἐν Ἡρακλείᾳ περὶ τὸν Λύκον
ποταμόν· ἐγκαταλειφθέντα δ' ἀπομορφοῦνται καὶ διαμένει. τὴν διαμονὴν
δὲ οὐκ ἄτοπον εἶναι· τροφῆς γὰρ ὀλίγης δεῖται πολλὰ τῶν τοιούτων ὥσπερ 75
καὶ οἱ ὄφεις καὶ τὰ φωλεύοντα. συμβαίνει δὲ καὶ ταύτην ἱκανὴν ἔχειν
ὧν τὴν πρώτην καὶ μετὰ ταῦτα τὴν ἐκ τῆς γῆς ἰκμάδα διαδιδομένην·
οὐ μὴν μέγεθός γε τοιαῦτα λαμβάνειν οὐτ' εἰκὸς οὔτε φασὶ διὰ τὸ μήτε

58-60 *Seneca, Nat. quaest.* 3.16.5, *Theophrasto nominato*; *Athenaeus, Deipnos.* 8.2
331C, *Theophrasto nominato* 58-62 *Thomas Cantimpratensis, De rerum natura*
7.36 (p.262.24-8 Boese) 58-64 *Plinius, Nat. hist.* 9.176, *Theophrasto nominato*;
[*Aristoteles*], *Mirabilia* 73 835b15-22 59-62 *Albertus Magnus, De animalibus*
24.52 (p.1533.31-5 Stadler), *Theophrasto nominato* 64-7 *Plinius, Nat. hist.* 9.
177, *Theophrasto nominato*; *Athenaeus, Deipnos.* 8.2 331C, *Theophrasto nominato*;
[*Aristoteles*], *Mirabilia* 63 835a19-21; *Ovidius, Tristia* 3.10.47 74 et 80-4 *Plinius,*
Nat. hist. 9.177 (*sed duobus generibus confusis*), *Theophrasto nominato*

54 γ' ὢν *coni. Schneider* : γοῦν *codd.* 55 εἰ μὴ καὶ] εἰ καὶ μὴ *coni. Wimmer*
58 γὰρ *secl. Wimmer, exhib. A* : τῶν *Ald.* : καθάπερ περὶ Τίον, περὶ Ἡρακλείαν
ex Athenaeo coni. Schweighäuser vol.4 59 τῶν] καὶ *Schneider vol.4* 62
δύεσθαι *vulg.* : λύεσθαι *A* 63 ἐν τῇ γῇ ὥσπερ *Wimmer comparato [Aristotele]* :
ἐν τῷ ζῆν ἢ καὶ *A* : ἐν τῷ πληρῷ ζῆν ἢ καὶ *Schneider* φωλείαις] φολέναις
sic A 64 διαρκοῦντας *A* et *Schneider vol.5* : διαναρκῶντας *L mg. Ald.* 65
τὸ *add. Schneider* ὅταν περιλαμβάνονται *vulg.* : ὅθεν περιλαμβάνονται *sic A*
66 οἱ *Wimmer ex Athenaeo* : καὶ *A* 72 οὕτως *nos* : αὕτη *A* : *sponte* (= αὐτομάτῃ?)
suppl. Furlanus 73 κεστρινίσκος *vel* κεστρίνος *coni. Schneider* : κεντρίσκος *A*
76 φωλεύοντα *vulg.* : φολοῦντα *A*

be, being closer to fire, (then) that which is surrounded by air will always be less warm (in itself). But even if this is not opposed to what (we) are now (saying), it is (opposed) to the opinion that is stated, that the warmest of all (creatures) are those which have blood and produce live young. Well, these matters must be considered.

- 7 Those fish which are dug up—for there are even (fish) of this sort in some places, as in the region of Heracleia and elsewhere in the area of the Black Sea—occur both beside the rivers and in the water-meadows. It happens that, when these dry up and (the fish) are left behind, they gradually draw themselves in and, pursuing the moisture, burrow below the earth; and then, when it dries out, they remain in the earth, as if preserved by salting in the
8 moisture, just like (creatures) which survive by hiding in lairs. But when they are dug up, they move. Very similar to this is the case of the (fish) that are frozen in the Black Sea when they are caught in the ice; they do not have sensation and movement until they are put in the pans and boiled. This seems to happen most of all to the goby.

- In general, fish that are dug out occur because, when rivers that overflow settle back into their original channel, they leave behind, in the (places) that dry up, in one place eggs, in another principles of the sort from which there
9 is generation—for some do not come from living creatures, as with the eel; and it seems that the so called “small mullet”, too, comes to be in this way—as in Heracleia, too, around the river Lycus; these are left behind, take their shape, and remain there. That (the fish, when they develop) do remain (in the ground) is not strange; for many such (creatures) do not need much nourishment, like serpents, too, and (creatures) that hibernate; and it happens that they have sufficient (nourishment), first of all from the eggs, and then from the moisture that is secreted from the earth. But it is not reasonable that such (creatures) should reach a large size, and it is not said that they

- χώραν ἔχειν μήτε τροφήν δαψιλῇ· δεῖ δὲ ἄμφω ταῦτα πρὸς τὴν αὐξησιν.
 10 τὸ δ' ἐν τῷ ἀέρι δύνασθαι διαμένειν τούτοις μὲν οὐ παντελῶς ὑπάρχει, 80
 τοῖς δ' ἐξιούσιν ἐκ τῶν τόπων καὶ νεμομένοις· αὐτοὶ δὲ μικρὰς εἰώθασιν
 δέεσθαι καταψύξεως ὥστε σύμμετρον αὐτοῖς εἶναι τὴν ἀπὸ τοῦ ἀέρος.
 δηλοῖ δὲ καὶ ἡ τῶν βραγχίων στενότης ὡς οὐ πολλῆς δεομένων· διὸ καὶ
 ἡ ἔγχελυς ἐν τε τῷ ἀέρι πολὺν χρόνον ζῇ καὶ ἐν τοῖς θολεροῖς ὕδασι
 τάχιστα ἀποπνίγεται. καὶ ἅμα ἐν τοῖς γε ὀρυκτοῖς καὶ ἡ ἀπὸ τῆς γῆς 85
 ἀπόψυξις ἐκ τῆς περιοχῆς ἱκανὴν ποιεῖ τὴν βοήθειαν.
- 11 ἴδιον δέ τι παρὰ ταῦτα καὶ λόγου δεόμενον τὸ περὶ τοὺς ἐν Παφλαγονίᾳ
 ὀρυκτοὺς ἰχθῦς· ὀρύττεσθαι γὰρ φασιν ἐκεῖ κατὰ βάθους πλείονος ἀγαθοὺς
 καὶ πολλοὺς· τὸν δὲ τόπον οὗτ' ἐπικλυσιν ποταμοῦ λαμβάνειν οὐθ' ὕδατος
 σύστασιν, ἀφ' ὧν δὴ φαμεν ἐγκαταλείπεσθαι τὰ ὡὰ καὶ τὰς ἀρχὰς τῆς 90
 γενέσεως. λοιπὸν γὰρ δὴ αὐτομάτους φύεσθαι, καὶ τοῦτο συνεχῶς—
 ἀδύνατος γὰρ ἡ πρὸς ἀλλήλους μίξις—, εἴτε δὴ τοῦτο θετέον ὥσπερ
 ἐνύγρου τινὸς χώρας οὐσης καὶ τὸ ὅλον γονίμου τῶν τοιούτων διὰ τὸ
 συμμετρίαν τινὰ ἔχειν τοῦ θερμοῦ καὶ τοῦ ὑγροῦ—συμβαίνει γὰρ δὴ
 γίνεσθαι καὶ ἐτέρους τινὰς αὐτομάτους ἰχθῦς—, εἴτε διανάειν ἐκ τινων 95
 τόπων ὑγρότητας αἱ συνεπιφέρουσι τὰς γεννώσας ἀρχὰς· ὁ δὲ τόπος εὐφυῆς
 διὸ καὶ δέχεται καὶ ἐκτρέφει· σχεδὸν γὰρ οὐκ ἂν ἔτι πορρωτέρω τούτων.
- 12 ἐκεῖνο δ' ἂν τις σκέψαιτο περὶ ἀμφοτέρων τῶν γενῶν τῶν τε ἐν τῷ
 ξηρῷ καὶ τῶν ὀρυκτῶν· ἄρα γε εἰς ὕδωρ ἀφιέμενα ζῶη ἂν, ἢ τὴν οἰκείαν
 ζητοῖη χώραν καὶ τοῦτο αὐτοῖς ὥσπερ φύσις, καθάπερ καὶ τοῖς ἐν θαλάττῃ 100
 καὶ τοῖς (ἐν) ποταμοῖς; οὐδὲ γὰρ ταῦτα δέχεται τὰς μεταβολὰς πλὴν ὀλίγων.
 ἐπεὶ ὅσοι γε διὰ τὴν ἀναξηρασίαν καταδύονται καὶ ὅσοι περιλαμβά-
 νονται τοῖς πάγοις, φανερόν ὡς τούτοις γε οἰκείον τὸ ὑγρόν. εἰκὸς δὲ
 μᾶλλον καὶ τοῖς ὀρυκτοῖς καὶ τοῖς ἐτέροις, τοῖς μὲν ἀπλῶς, τοῖς δ' ὡς
 ἀμφιβίοις κατὰ Δημόκριτον. ὁ καὶ ἐπ' ἄλλων συμβαίνει· χρήται γὰρ ἔνια 105
 τῷ ἀέρι καθάπερ ἐρρέθη πρότερον.

83-5 *Aristoteles, Hist. Anim.* 8.2 592a5 87-90 *Athenaeus, Deipnos.* 8.2 331D,
Theophrasto nominato; [*Aristoteles*], *Mirabilia* 74 835b23-6; *Strabo* 12.3.42 (p.563
Casaubon), *Eudoxo nominato* 87-93 *Plinius, Nat. hist.* 9.178, *Theophrasto nominato*
 98-106 *Democritus, fr.* 68A155b *Diels-Kranz*

80 ὑπάρχει *vulg.* : ὑπάρχειν A 83 δεομένων *vulg.* : δεομένου A 84 ἔγχελυς
Furlanus, Schneider vol.4 p.807 : ἔγχυσις A : ἄγχυσις L Ald. 87 τι *Wimmer* :
 τὸ A : *del. Schneider* 88 ὀρυκτοὺς *vulg.* : τοὺς ὀρεκτοὺς A ὀρύττεσθαι
vulg. : ὀρύγεσθαι A 99 ἀφιέμενα *vulg.* : ἀφιέμενοι A 101 ἐν *add. Schneider*
vol.4 104 ἀπλῶς *Schneider vol.4* : ἀπλοῖς A

do, because they do not have either space or abundant food, and both these are needed for growth.

- 10 The ability to remain in air is not possessed by these (fish) at all, but by those which come out of the places (where they originate) and search for food; these customarily do not need much cooling, so that cooling by the air is sufficient for them. The narrowness of their gills, too, shows that they do not need much (cooling); and for this reason the eel, too, lives for a long time in the air, but is quickly stifled in muddy water. And at the same time, at least in the case of the (fish) which are dug up, the cooling from the surrounding earth too provides sufficient assistance for them.
- 11 A special case besides these, which needs discussion, is that of the fish which are dug up in Paphlagonia. For they say that many fine fish are dug up there from a considerable depth; but the place is not flooded by rivers and water does not collect there, these, we say, being the causes of eggs and principles of generation being left behind. It remains, then, that (these fish) grow spontaneously, and do so continually—for it is impossible for them to mate with one another—, whether we are to suppose that this is because the place is a moist one and in general productive of such things, because there is a certain proportion between the warm and the moist—for certain other fish, too, are produced spontaneously—, or whether (we are to suppose) that moisture percolates from certain places and brings the generative principles with it. The place is naturally suited, and for this reason it both receives (the principles) and nurtures them; for I suppose (this) would no longer (happen) further away from these (places).
- 12 One might consider this point about both types, about those on dry land and those that are dug up; if they were released into the water would they survive (there), or would they seek their own proper place, and is this as it were natural to them, as for those in the sea and those in rivers? For these too do not tolerate change, except for a few of them. —Well, as for those that burrow down because of the drying-up and those that are caught in the ice, it is clear that for these at least moisture is their proper (element). And it is more reasonable that it should be so both for those that are dug up and for the others, for the former without qualification, for the latter in that they have “a double way of life”, according to Democritus. And this happens in other cases too; for some use air (for cooling), as was said earlier.

COMMENTARY

This Commentary is to be read in conjunction with the Introduction, where the more general issues raised by the text are discussed.

1 on dry land ... for it seems] Some words are missing here. See Introduction, Note 11.

what is called the sleeper-out] The name *exōkoitos* was misapplied by Artedi and Linnaeus to the flying fish, *Exocoetus volitans* Linnaeus (D'Arcy Thompson p.63); and this, as pointed out by Colin Haycraft in a letter to the London *Times*, is how it became the name of a famous naval missile of the 1980's, the Exocet. But the flying fish is clearly not what Theophrastus has in mind. There are further descriptions in other ancient sources, according to which the *exōkoitos* sleeps on the rocks but is in danger from attack by birds: Clearchus fr. 101 Wehrli ap. Athenaeus 332C; Oppian, *Halieutica* 1.155ff.; Aelian, *NA* 9.36; Manuel Philes, *De animalium proprietate* 114 (98) 1919-1944 (p.46 Dübner, though he brackets this passage); D'Arcy Thompson, 63-4, observing that the names Clearchus gives to the birds, Cerylus, Trochilus and Helorius, are legendary or poetic. Pliny 9.70 makes the *exōkoitos* a fresh-water fish in Arcadia, but this is apparently the result of a conflation of the Clearchus passage with the following quotation in Athenaeus (332E). Some sources also give the *exōkoitos* the alternative name *adōnis* (Aelian, 9.36; Clearchus ap. Athenaeus 8.332C. D'Arcy Thompson, 3).

D'Arcy Thompson also cites, in connection with the *exōkoitos*, a passage from book 2 of Oppian's *Halieutica*; at 2.199-224 Oppian refers to a fish that is lazy and greedy, lying on the shore—as D'Arcy Thompson puts it—all day and going about its business at night; for that reason, presumably, it is called *nukteris*, “Bat”. It has eyes on top of its head, and a cruel mouth between them. But this seems to be a confusion; Oppian is here referring not to the *exōkoitos* or “sleeper-out”, but to the *hēmerokoitēs* or “day-sleeper”, which is probably to be identified with *Uranoscopus scaber* Linnaeus (Mair 300 n.(b).) Indeed D'Arcy Thompson has a cross-reference from his discussion of the *exōkoitos* to the *kalliðnumos*, another name for the *hēmerokoitēs*; cf. his pp.98-9. The *hēmerokoitēs* sleeps in the sand in the daytime according to Oppian, but there is no indication that this is not the sand at the bottom of the sea.

The sources describe the *exōkoitos* as a kind of grey mullet, *kestreus* (Aelian, *NA* 9.36; Manuel Philes 114 (98) 1919, p.46 Dübner), or more cautiously as *like* a grey mullet (Oppian, *Halieutica* 1.156). However Mair p.220 n.(b) argues convincingly that this does not relate to its appearance, but are simply careless reporting of Clearchus' statement that it is much the same size as the small mullets, *kestriniskoi*, found near the shore; that is, Clearchus says, 8 fingers' breadth long at most (about 5.5 inches). Clearchus also says that the *exōkoitos* is slender, but not a flat-fish.

The *exōkoitos* has most commonly been identified as a type of goby or blenny (D'Arcy Thompson 63.) Gronow placed a number of types of blenny in a genus *Adonis*, notably *Blennius ocellaris* Linnaeus (a Mediterranean species) = *Adonis pavoninus* Gronow (Gray 93-7; Jordan, 1963, p.258; Hureau and Monod 519); but I do not know whether, in doing so, he had in mind the name *Adōnis* given to the *exōkoitos* in the ancient sources. Mair gives a list of types of blennies found in Greek waters, and says that the description by Clearchus fits Montague's Blenny, *Blennius Montaguī* Fleming (Mair, loc. cit.). D'Arcy Thompson however argues that the detailed descriptions do not fit, and that the name may be a non-Greek one and the story of the fish sleeping on land the result of popular etymology; though he also notes (p.64) that Clearchus' description suggests a brightly coloured tropical fish. According to Clearchus the *exōkoitos* is reddish (*hupopurros*), with a continuous white stripe on each side, and resembles the fish called "Goat", except for the black patch under the stomach or mouth which is called the "Goat's beard". (It should perhaps be stressed that it is the unidentified Goat-fish that has the black patch; this detail does not help us with regard to the *exōkoitos* itself.) Aelian describes the *exōkoitos* as *xanthos*, which can indicate a reddish-yellow colour.

Theophrastus' description suggests that the fish in question is exceptional in the extent to which it stays on land. But he does not mention any particular region in which the *exōkoitos* is found, as he does in the case of the two following examples; and that may suggest, as it apparently did to Mair, that the fish is found or imagined to be found in Greek waters. However, even more extreme behaviour than that which Theophrastus attributes to the *exōkoitos* may be found among tropical fish.

Clearchus, as reported by Athenaeus 8 332dE, says that the *exōkoitos* sleeps on land till it has had all the sleep it wants, and then "rolls close to the water, until once more the surf catches it up and carries it with the reflux back into the sea". There is a fish in the Indian Ocean and especially the Andaman islands, *Anadamia heteroptera* (*Andamia expansa* Blyth, *Salarias heteropterus* Bleeker, *Salarias aequipinnis* Gunther. See Blyth 270-1; Day 323-4; Annandale and Hora, 39-41), a type of blenny (Mukerji 121-3 refers to earlier discussions of whether the genus *Andamia* should be referred to the family of *Blenniidae* or of *Runulidae*; but *Runulidae* are in any case grouped with blennies by Jordan, 1963, p. [733]233; see Annandale and Hora 39-40). This "lives in the spray, following the tide and always out of the water" (Carter 67, citing Hora 1932B, though in fact the reference should be to Hora 1932A). Hora's report is further elaborated by Mukerji. The fish lives on rocks, hiding in crevices of the cliffs at high tide, but coming out and moving about over the rocks at low tide; one observer noted "On three occasions I observed the fish ... lying practically on their sides on the dry rocks in the brightest sunshine, apparently in a torpid condition; but when approached they jumped off into the water, skimmed along the surface and perched themselves on another rock." (Mukerji, loc. cit.)

The connection of the fish with the surf in both cases is natural enough indeed

where fish out of water are concerned. But whereas Theophrastus' fish sleeps on land daily, *Andamia* is always out of the water; and with good reason, for its adaptation to air breathing is so complete that it cannot survive under water, even in water with plenty of oxygen, if prevented from coming to the surface. Hora observes "It is never found under water except for short periods when it may be accidentally submerged by the swell of the sea. In fact, it has been found experimentally that when individuals are kept under water, however highly oxygenated it may be, and prevented from access to air, they die of asphyxiation."

I do not wish to suggest an identification of Theophrastus' *exōkoitos* with *Andamia*. But the latter may serve as an extreme example of the type of behaviour that Theophrastus attributes to the former.

the seal and the turtle and some other creatures] *Emus* is Schneider's emendation for *mus* of the MSS. D'Arcy Thompson at pp.167-8 argues that what is meant is the turtle, though *emus* is more often used of pond-tortoises (as at Aristotle *HA* 5.3 558a8), and was so interpreted by Schneider (vol.4 p.801). But d'Arcy Thompson also shows that there was an ancient confusion, *mus* being found not just in the MSS here but also in Pliny (9.71 and 9.166), Oppian *Halieutica* 1.174 and Aelian *De natura animalium* 9.41. Pliny refers to *marini mures* on beaches or laying their eggs on beaches; Aristotle refers to sea-tortoises, *thalattiai chelōnai*, as doing the same at *HA* 5.3 558a11 (cf. *ibid.* 8.2 590b6-7).

take in sea-water and blow it out again through necessity] This probably alludes to the dolphin's doing so while feeding; see Introduction at n.18. Schneider *loc. cit.* sees a further contrast here with the "sleeper-out", in that that apparently comes out of the water not to feed but simply in order to sleep.

2 The little fish in India] These are also mentioned by Pliny, who says that they come on land to find safe breeding places (*NH* 9.71) and by Athenaeus, who says that they are like *maxeinoi* (8.4 332B). The pseudo-Aristotle *Mirabilia* (71) say that they are like *mazinai*, and link them with a region called Ceras. For Athenaeus' *maxeinoi* Cuvier suggested *muxinoi*, mullets; D'Arcy Thompson p.152-3 regards *mazinēs*, *mazeinos*, *maxeinos* and the like as names for fish like the cod, though he also notes that *mazzono* is a Sicilian name for the goby, and suggests that Theophrastus might have some fish of that type in mind here.

D'Arcy Thompson's principal suggestion, however (p.95), is that Theophrastus' Indian fish are to be linked with species like the climbing perch, *Anabas scandens*. In what sense *Anabas scandens* actually climbs trees seems to be a moot point. Das at 191 argues that it only moves along the horizontal portions of trees on river banks, and is found high up in trees because birds take it up there and leave it there to eat later. Gunther 516 cites a report of the fish climbing five feet up a tree, but Jordan, 1907, 581 adds further observations which confirm Das's view that the fish gets on to branches growing over pools and that it reaches this height above ground largely by proceeding sideways along branches. Theophrastus does not himself mention the tree-climbing habit at all. *Anabas scandens* is typically

six inches in length (Monro 226), but the comparison with the *maxeinos* (above) may in any case be in appearance rather than size.

Other air-breathing fish in Southern Asia come out of the water—*Pseudapocryptes* (a type of Goby, according to Monro 242) and *Saccobranchus fossilis* Day (*Heteropneustes fossilis* Bloch) (Das; Monro 50; Carter 67). There is also the “snake-headed mullet”, of the genus *Ophicephalidae* or “China-fishes”, of which Das 194 says “these fish are found in rivers, ponds and tanks, but also in foul stagnant pools in marshes among shrubby vegetation. They ‘walk’ over ground from one pool to another, especially at night; indeed, this habit is so well known that they are frequently exhibited walking on the ground by jugglers.” Manuel Philes refers to mullets (*kestreus*) sleeping on the coast (113 [97] 1913-18 [p.46 Dubner], D’Arcy Thompson 109). He does not specify the locality. This might be a reference to the snake-head mullets, which are found in India, but also cross to the coast of Africa, and survive drought by lying in mud, breathing air as well as water, coming to the surface of the mud, and in the case of some species to the surface of the water too, in order to take in air (Jordan, 584-5; Das, 194-5). But I wonder whether there may not be some confusion resulting from regarding the *exōkoitos* as actually a type of mullet; see above on section 1. None of these fish is described as jumping about like a frog; Das 190 does observe of *Anabas scandens* that “after a shower of rain it emerges from the water and invades damp gardens in search of earthworms. Here the males may be seen fighting with each other and chasing the females.”

Theophrastus does not explicitly say of the Indian fish, as he does of the *exōkoitos*, that it takes in air as well as water, but the contrast that he does make with the *exōkoitos* involves the length of time spent on land, which suggests that taking in air as well as water for cooling is common to both. *Anabas scandens* does in fact take in air, and although it does not have lungs it has a special chamber above its gills containing bony plates, which aids it in extracting oxygen from the air. (On the details cf. Das 191-4, criticising earlier accounts.) *Saccobranchus fossilis* has air-chambers attached to the gill-chambers; the snake-headed mullets breathe air through the pharynx (Das, 188-90, 196-7; Carter, 70).

There are certain fish in the region of Babylon It seems (Stadler 1522, followed by Scanlon 335) that these are to be identified with “mud skippers”, *Periophthalmus kolreuteri* Day (= *Gobius kolreuteri* Pallas; Monro 243), found in the Indian Ocean and described by D’Arcy Thompson 139 as a type of goby. Theophrastus himself says that the bodies of these fish are like those of gobies, their heads like a “sea-frog”, that is a sea-angler or fishing-frog, *Lophius piscatorius* Linnaeus (D’Arcy Thompson 28). He also specifies that the gills are like those of other fish; in fact *Periophthalmus* takes in air partly through the lining of its pharynx and partly through its skin (Carter 68, 70, 71).

3 the hippopotamus An example of a footed, air-cooled creature which gets its nourishment from the water and so spends most of its time there. See

Introduction, note 17.

what is remarkable ... is that something should be able, with the same organs, at one time to draw in and take in air, and at another time to take in moisture] It isn't clear whether the reference to "the same organs" is meant to cover all the examples of dualizing by taking in both air and water. Theophrastus certainly does not specify that any of the creatures he discusses has different organs for the two purposes. There are in fact species of fish which possess lungs (Carter 70), especially in tropical Africa and in America, but it seems that Theophrastus has not heard of any of these.

4 The case of octopuses is less remarkable, for they do not take in sea-water] This must be read in context as a statement that they do not do so for cooling; so Schneider 803-4, following Casaubon. Aristotle states that molluscs and crustaceans, including the octopus, are sufficiently cooled by the surrounding water and take in water just in the course of feeding (Aristotle, *De respiratione* 12 476b30, cf. *HA* 4.1 524a9, 8.2 589b20). The belief that the octopus comes on land to feed was widespread in antiquity (Aristotle, *HA* 9.37 622a31; Aelian, *De nat. anim.* 9.45, also 13.6—a giant octopus in a cellar; Oppian, *Halieutica* 1.310). It was even believed to climb fruit-trees (Clearchus, fr.102 Wehrli = Athenaeus 7.103 317c; Oppian 4.264-307). D'Arcy Thompson 207 suggests that this story originated because octopus eggs looked like olives.

This seems to happen in the case of eels too] That eels and serpentine fish need little cooling and can live out of water is asserted by Aristotle, *Parts of animals* 4.13 696b21. Eels and a kind of *kestreus*, grey mullet, have little blood (which goes with not needing much cooling; above, Introduction section II), according to Aristotle, *Generation of animals* 3.11 762b24-8. Eels out of water are also mentioned by Athenaeus 7.90 312B, naming Theophrastus, and by Oppian 1.397. See D'Arcy Thompson 59-60. Eels do in fact cross wet grass in order to ascend rivers from the sea; they absorb air through their skin (Carter 67, 71; Das 210-11).

It is not at all strange that this should apply to the sea-eel] That the sea-eel, *Muraena helena*, feeds on land is asserted by Oppian 1.556 and Pliny 9.71; that it mates with land-serpents is claimed by Pliny 9.76. (D'Arcy Thompson 162-4). At Aristotle, *Hist. anim.* 5.10 543a28 it is said that the *smuros* (*Muraena unicolor*, Peck in the Loeb ed. ad loc.; cf. D'Arcy Thompson 165) and the *smuraina* come out on dry land; but D'Arcy Thompson 165 regards this sentence as interpolated from *Parts of Animals* 696b21 and referring to the common eel. At *Hist. Anim.* 8.13 598a14 we are told that the *muraina* dualizes between being out at sea or nearer to the coast.

5 It is also reasonable that (the eel) should be less able to remain] Is the reference to the eel (mentioned in lines 39-41), regarding 42-3 as parenthetical; to the sea-eel and other creatures in lines 42-3; or to both? If the reference is to the sea-eel rather than the eel, Theophrastus seems to slide in a rather awkward fashion from one topic to the next, since 42-3 cannot be understood grammatically

apart from 39-41. Schneider indeed argued (vol.4 p.804) that a new topic, the inability of sea-fish to tolerate fresh water, is introduced at the start of section 5. If the reference was to eels, he argues, *mē* in line 43 would need to be deleted, presumably because eels *are* found in fresh water. (But see below). Nevertheless, the introduction of a new topic seems awkwardly abrupt; and the argument could hardly be that *all* sea-fish are unable to tolerate fresh water. Apart from the fact that that would necessitate taking the point about the Black Sea at 45-6 as a parenthetical remark about the octopus only (for there certainly are some sea-fish in the Black Sea), at the end of section 5 and in section 6 (below) Theophrastus categorically asserts that sea-fish do go up into rivers to spawn.

in as much of sea-water as is thinner and closer to air in consistency] This clause is grammatically ambiguous. *hosōi* could in principle be understood either as a relative with *īōi hudati* as its antecedent and attracted into the same case as it ("it cannot remain in water, as much [water] as is rarer"), or adverbially, as dative of measure of difference ("it cannot remain in water in so far as (the water) is rarer"). Theophrastus' usage very strongly suggests the latter; of 37 other occasions in all his works when he uses *hosōi*, according to the *Thesaurus Linguae Graecae* CD-ROM disc (searched with the aid of an Ibycus Scholarly Computer), in *every one* the dative is used adverbially. The feminine *hosēi* is not found in his works at all; of the ten occurrences of the plurals *hosois* and *hosais* there is one (*Hist. Plant.* 6.8.1) where the dative has a partitive genitive depending on it, but no parallel to the partitive idea being expressed by an antecedent as in "water, as much [water] as is rarer". So the evidence for interpreting *hosōi* adverbially seems overwhelming. And along with the interpretation of *hosōi* as anything other than adverbial there also disappears the possibility of taking *tēs thalassēs* as partitive genitive: "water, as much of the water of the sea as is rarer and closer to air", when what is at issue would be a difference between different types of sea-water.

The genitive *tēs thalassēs* could still however be understood either (1) as a defining genitive, ("the water of the sea, which is rarer and closer to air"), or (2) as comparative ("water which is rarer than that of the sea and closer to air"). But (1) can be ruled out at once. It suggests that sea-water is less dense than fresh water; but that is contrary not only to fact—things float more easily in salt water—but also to the opinion of Aristotle (*Meteor.* 2.3 359a5, *GA* 3.11 761b9, 762a27; cf. [Aristotle], *Problems* 23.8, 10, 13, 20 and 38; the greater density of sea-water is sometimes, but not always, explained in these texts as the result of an earthy admixture.)

We are left, then, with (2), suggesting that the water in question is river-water as opposed to sea-water. It might be thought that the reference to the Black Sea comes awkwardly after this; but it seems quite in the style of the treatise to tack on a reference to a particularly cold part of the sea after an initial contrast between colder fresher rivers and warmer denser sea. MS A has a comma after *tēs thalassēs*, which—for what it is worth—supports this interpretation, making the two phrases,

each with a comparative, parallel. Wimmer and Schneider both opt for this interpretation, too. (In the Latin translation of our passage printed by Wimmer, *quatenus tenuior marina cum sit*, *marina* can be taken as either nominative (1) or ablative (2); but it is clear, from the addition of *fluviorum* in the preceding clause, that the point is taken to be that eels cannot remain in river-water because it is less dense than sea-water.)

If the creatures under discussion are or include eels, it seems odd to suggest that eels avoid rivers altogether; this is why Schneider suggested a change of subject to sea-fish in general. However, eels do migrate from the rivers to the sea as they grow older, and "is less able to remain" could be taken as referring to this. It would have to be supposed that the parts of the sea they do not enter at all are even colder and rarer than rivers even though the sea as a whole is warmer and denser. If on the other hand the reference was to the sea-eel or *muraena* rather than to the ordinary eel there would be no difficulty; for the sea-eel does not enter rivers, at least according to Galen, *De alimentorum facultatibus* 3.29, CMG vol.5.4.2 369.10-12 Helmreich (D'Arcy Thompson 165), an interesting passage on the effects of sewage outfall at Rome on the quality of sea-fish at the mouth of the Tiber. The lamprey, also called *muraena* in antiquity, is indeed a fresh-water fish in the case of some species, and others ascend rivers to breed; but the lamprey and the sea-eel are distinct (D'Arcy Thompson 163-5).

and also on account of (the water in question) being naturally colder] So Wimmer's text, reading *kai hoti phusei ge psuchroteron esti*. This however is Wimmer's silent alteration of the text; A in fact has *kai to phusei ge psuchroteron esti*, and that is what appears both in the text and in the lemma in the commentary of Schneider, the editor before Wimmer. However Furlanus' Latin translation, as quoted by Schneider, has *quin et quod frigidior est quam illorum naturae conveniat*, "and also on account of its being too cold to suit their nature". Schneider objects, presumably to Furlanus' interpretation of the dative *phusei*, but it looks as if Wimmer has incorporated Furlanus' *quod* into his Greek text without comment.

With Wimmer's text, taking *hoti* as "because", the sense could be either (i) "because it (the creature) is colder by nature (and so less able to tolerate cold water)", or (ii) "because it (the water) is colder by nature (so that a colder creature is less able to tolerate it)." Either (i) or (ii) would make good sense. Sea-water is in general not only denser but warmer than fresh water, according to Theophrastus (section 6 init.; see also Steinmetz 298) and Aristotle (*Meteor.* 2.3 358b7, *Gen. Anim.* 3.11 761b9. Cf. also [Aristotle], *Problems* 23.7 932a39, 23.16 933a34, 26.30 943b11). This explains why cold and bloodless creatures like testacea and cephalopods are produced in salt lagoons and at the mouths of rivers, not in fresh-water lakes (Aristotle, *Gen. Anim.* 3.11 761b3ff.). The neuter gender of *psuchroteron* is not perhaps too great a difficulty for (i), even if the reference is to eels (feminine plural in line 40) specifically rather than additionally or solely to the creatures referred to in lines 42-3, where the neuter *toiouton* occurs. However, a reference

(ii) to the water rather than the creature would make the next clause, "and this is why the octopus avoids it", follow more easily. But then, unless we follow Schneider's conjecture, "the water in question" has to be supplied as the subject of *esti*.

for this reason it does not occur in the region of the Hellespont and the Black Sea] At first sight this refers to the octopus, and similar assertions are made concerning the Black Sea by other ancient authorities—Aristotle, *HA* 8.28 606a10 (no cephalopods or testacea, or only a very few in certain places), Aelian, *NA* 17.10 (no cephalopods or testacea), Oppian, *Halieutica* 1.609 (no octopuses, lobsters, or crabs). Pliny, *NH* 9.52 says that the *sepia* (cuttlefish) is not found in the Black Sea while the *lolligo* (squid) is. Cf. D'Arcy Thompson 207. None of these mention the Hellespont, though. Theophrastus Simocatta, *Quaest. Nat.* 1.9 gives the reason as that aquatic creatures needing cooling make for rivers, those in need of heat for the sea; the northern sea—i.e. the Black Sea—is cold, and also fresher than other sea-water because of the number of rivers that flow into it (cf. [Aristotle], *Problems* 23.6). Mair p.264 n.(a) cites Forbes p.203, for the absence in fact of cephalopods from the Black Sea; so too Ekman 93.

However, it seems that eels too are absent from the Black Sea (Günther 672; D'Arcy Thompson 60, saying that there is no ancient attestation of the fact. That eels cannot endure sudden changes is stated at Aristotle, *HA* 8.2 592a17, with the example of change to cold water being given.) There are other creatures too that are not found in the Black Sea; that this applies to the Spanish mackerel (*kolias*) is stated by Aristotle, *HA* 8.13 598a24 (D'Arcy Thompson 120-1). The difference in fauna between the Black Sea and the Mediterranean is to be explained by the low temperature and low salinity of the former and the geologically recent communication between the two, according to Ekman (91-4) and Forbes (loc. cit.). And Theophrastus *could* have intended a reference to the eel here, that to the octopus in line 62 being parenthetical.

Athenaeus (7.104 317F) cites our present text for octopuses not taking in sea-water, but Theophrastus' work *On Differences with regard to Locality* for octopuses not being in the Hellespont because the water there is cold and less salty. Athenaeus could have cited a different work for the absence of octopuses from the Hellespont because he took the present sentence to refer not to the octopus but to the eel. But that is probably over-subtle; and Theophrastus does seem regularly to have used similar observations in more than one work; cf. my discussion in Sharples, 1988B, at 41-5.

6 (creatures) from the rivers] Schneider, vol.4 p.805, argues that "creatures" rather than just "fish" should be understood here.

those from the sea (can remain) in the rivers and marshes] One might then ask why, if sea-creatures in general can tolerate cold river water, the octopus is not found in the Hellespont and the Black Sea. The answer might be, as already suggested (pp.373-4) that the water of the Hellespont and Black Sea is even colder

than many rivers. Or else it could be that the octopus is colder in itself than the sea-creatures that can tolerate fresh water discussed in section 6, and so less able to tolerate cold; that it is colder in itself is indeed suggested by the fact that, unlike salt-water fish, it does not need to take in water for cooling.

if it is the air ... being closer to fire] Zeller 836 n.1 suggested that this referred to the physical position of the elements in the universe. It could however refer to consistency as well—the two interpretations are not mutually exclusive—and in section 5 it is natural to take the reference to rarer water being closer to air as a reference to its consistency rather than to its position. There might indeed seem to be a conflict between the claim here that air is warmer than water and the apparent suggestion in section 5 that water which is less dense *and closer to air* is colder; but it does seem to be standard Peripatetic doctrine that density and warmth go together where sea-water is concerned, and otherwise it would be less clear why in section 5 creatures that are less able to tolerate colder water should also be less able to tolerate what is rarer. (The density of sea-water was not however a simple matter; several of the pseudo-Aristotelian *Problems* contain suggestions that sea-water is denser in itself than fresh water, but contains larger voids (23.8), and one argues that warm salt water is less dense than cold salt water (23.20). Solidity and heat retention are linked at *Problem* 1.36 (on metals).

that which is surrounded by air will always be less warm] Taking *toutōi* to refer to air. Schneider vol.4 805 argues that it refers to water (*toutōi referendum ad hudōr, non ad aerem, ut fecit Furlanus*); but then it is difficult to see how there can be a conflict with the claim that blooded viviparous creatures are the warmest.

even if this is not opposed to what we are now saying] See Introduction, section III.

7 as in the region of Heracleia and elsewhere in the area of the Black Sea] Other authorities couple various other town names with Heracleia: Pliny, citing Theophrastus, refers to Heraclea and Cromna (so Gelenius; Crona(m) or Chronium, MSS); Athenaeus, also citing Theophrastus, to Heracleia and the Milesian colony Tium; and pseudo-Aristotle (*Mirabilia*) to Heraclea in Pontus and to Rhegium, emended to Tium by editors (Rhuthium in one MS; Tium proposed by Pintianus and Rose). Schweighäuser proposed adding Tium before Heracleia in the text of Theophrastus, as in Athenaeus. The towns Heracleia, Cromna and Tium were all close together on the Black Sea coast of Paphlagonia, and Cromna and Tium were in the early third century B.C. united, together with Sesamus and Cyturus or Cytorum, famous for its box-trees (Catullus, poem 4) near Sinope, into a single city Amestris, though Tium soon revolted (Strabo 12.3.10; Tiejium eds. for MSS Tiejium; Tium in the epitome of Strabo, followed by other editors. Heracleia is discussed at Strabo 12.3.6, Tiejium at 12.3.8.). Amastris or Amestris became the capital of Roman Paphlagonia.

Commentators have suggested that this fish is a type of loach, *Cobitis fossilis* (Stadler in his index, vol. 2 p.1619; Scanlan, 353; so too Cuvier cited by de Saint-

Denis 150). There is an apparent problem, in that nowadays at least *Cobitis* or *Misgurnus fossilis* Linnaeus (for the identity of the names cf. Jordan 65) is found in most of central Europe and on the north coast of the Black Sea, but not on the southern coast (Blanc no.286). *Misgurnus fossilis* in fact breathes air through its intestines (Carter 71). Among loaches that breathe air in this way Das 211 mentions not only *Misgurnus fossilis* Linnaeus but also *Cobitis taenia* Linnaeus and *Lepidocephalichthys balgara*, though Theophrastus does not mention air-breathing here and indeed distinguishes in section 10 between fish that remain in air and fish found underground.

Pliny's report of Theophrastus' description of the fish near Heraclea was, it seems, misinterpreted by Thomas of Cantimpré, who states that the fish dig into the ground between rivers with such effort that they travel from one river to another (Thomas of Cantimpré, *De rerum natura* 7.36, p.262.24-8 ed. H. Boese, Berlin 1973; cited by Stadler in his note to Albertus Magnus, *De animalibus* 24.52, p.1533.32-5). Thomas also placed the phrase *reciprocis amnibus* ("in rivers that flow back again", i.e. tidal rivers that rise and fall) in close proximity to a reference to underground *cavernae* or "burrows"; and his version seems in turn to have led Albertus Magnus to convert the report into one of fish that pass from one river to another where rivers meet underground (Albertus Magnus, *De animalibus* 24.52, p.1533.32-5 Stadler, naming Theophrastus). Albert may have been encouraged in this by what he took to be Theophrastean material in Seneca, *Natural Questions* 3.16.4-5; a reference to fish being dug up at the end of section 5 is explicitly attributed to Theophrastus by Seneca, but Albert at *Meteorologica* 2.29, vol.4 p.533a6-b11 ed. Borgnet, to which Mrs Pamela Huby drew my attention, attributes all of sections k4 and 5 to Theophrastus. (See Steinmetz 244 n.3, 273). But I have discussed this at length elsewhere (Sharples, 1984, 186 and n.5; 1988A, 183-4).

A number of ancient authorities report fish dug up from the ground in the region between Perpignan and the Spanish frontier (Pomponius Mela 2.5.83; Strabo 4.1.6; Polybius 34 fr.10 Hultsch = Athenaeus 8.332AB). Cf. Walbank, vol.3, 610. Strabo refers to the fish being found two or three feet down in the marsh; Mela rejects the claim that the fish burrow into the ground, arguing that the river-margin is in fact a floating marsh and the fish are in the water underneath it. The passage is discussed by Voss, in the edition of Mela by Núñez (Nunnesius; Leiden 1748, note to be found on p.738-9), who draws the parallel with our text and with Pliny, and comments that fish following water underground would be less surprising than fish generated underground; see further below. Polybius says that the fish dig underground following water to get at the roots of the grass. See also [Aristotle], *Mirabilia* 89 (fish in a lake that silts over in the territory of the Massaliots; Schneider vol.4 p.810). Cornelius Agrippa (1486-1535), *De occulta philosophia* (1533, reprinted Graz 1967) 14 refers to Theophrastus for fish that are dug up, and also to Aristotle (presumably the *Mirabilia*) and Polybius.

8 The fish that are frozen in the Black Sea] Cf. D'Arcy Thompson 138. The

parallel reference from [Aristotle], *Mirabilia* 63 (which also mentions birds) comes from a sequence apparently linked with hibernation; see Sharples, 1988B, 42 and nn., and above, Introduction nn.6 and 30. Plutarch, *Prim. frig.* 18 953C cites Theophrastus for fish rigid with frost shattering like glass if dropped on the ground, but this may come rather from Theophrastus' work *On Hot and Cold* (Diogenes Laertius 5.44; Galen, *On the Aphorisms of Hippocrates* 14, vol.17.2 p.405.3 Kühn) or *On Solidifying and Melting* (Diogenes Laertius 5.45); Plutarch also cites Theophrastus at *Prim. frig.* 16 952AB for the effect of freezing in breaking vessels.

9 for some do not come from living creatures, such as the eel] It will be argued below that "these are left behind" in line 74 includes the eggs mentioned in line 71; and this implies that at least the words "for some do not come—comes to be in this way" are parenthetical. For "some do not come from living creatures" presumably refers to some form of spontaneous generation, rather than simply coming from eggs that are themselves produced by living creatures. And it is clear that eels do not remain underground once generated.

The suggestion that eels are spontaneously generated is not surprising, for the true facts about the procreation of eels were only discovered at the beginning of the present century. Jordan, 1907, 365 was still asserting that they do not go far out into the sea and prefer brackish water to that which is really salt; the truth, that eels do go out into deep ocean to spawn but that the adults never return, was only learned more recently (an apparent last-minute addition at Jordan, 1907, 367; D'Arcy Thompson 59; Peck, 1963, 565). No breeding adults had been observed (Aristotle, *Gen. Anim.* 2.5 741b1 suggests that there is no distinction among eels between male and female), and the young larvae returning from the ocean to fresh-water streams had not been linked with eels; so some other explanation of the origin of the young eels that were developed enough to be identified as such was needed.

There are four main theories in the ancient sources about the generation of eels. (i) According to Oppian and to a citation of Aristotle in Athenaeus (298C), not to be found in the extant works of Aristotle, copulating eels exude a substance which then causes the mud to conceive and produce young eels. Oppian, *Halieutica* 1.513-21, clearly indicates that the young eels are here generated from the mud, not by normal animal generation from parents. The citation of Aristotle could perhaps be understood in terms of eggs left in the mud. Plutarch, *Quaest. Conviv.* 2.3 637F simply refers to eels as being spontaneously generated from mud. See D'Arcy Thompson, 59. (ii) Pliny, *NH* 9.160 refers to eels rubbing against rocks, not apparently in the act of mating; the parts scraped off then come alive as young eels. (iii) Seneca at *Nat. Quaest.* 3.19.3 refers to eels breeding in secret places, as evidence for the existence of fish beneath the earth; D'Arcy Thompson, loc. cit. (iv) Aristotle in the extant works says that eels are generated from larvae, worms called "earth-guts", which are themselves spontaneously generated (Aristotle *Gen. Anim.* 3.11 762b21; apparently the round-worm *Gordius*, so Peck, 1963, p.361 note c.) The "earth-guts" are themselves said to be spontaneously generated at *HA*

6.16 570a15ff., where Aristotle rejects the view of some that eels are formed from worms that grow inside eels (D'Arcy Thompson, loc. cit.). These worms are not, it should be stressed, identical with the *actual* larvae of the eel. D'Arcy Thompson 59 indeed links Aristotle's "earth-guts", *gēs entera*, with a Sicilian term applying to the true larva, *casentule*; but the etymological connection seems implausible if Aristotle did not identify the true larva. D'Arcy Thompson indeed supposed he had; cf. his discussion in Livingstone 149-50.

And it seems that the so called "small mullet", too, comes to be in this way] Something is clearly wrong with the text as transmitted. Furlanus (ap. Schneider vol.4 p.807) supplied "spontaneously", rendering "for it seems that both this, and the so-called *kentriskos* (see below) come to be spontaneously". But a simpler sense can be obtained by emending *autē* to *houtōs*; and the connective *de* is easier thus (Furlanus had to render it by "For", which should be *gar*).

the so-called "small mullet"] The second spontaneously generated fish Theophrastus mentions is, in the MSS, the *kentriskos*. The case of the eel suggests that he may not actually wish to suggest that this is a fish that remains underground. Nor is it clear where it is said to be found. The immediately following clause, at lines 73-4 of section 9, refers to the river Lycus near Heracleia. But if the reference to the eel and the *kentriskos* is indeed parenthetical, it is not clear whether the reference to the Lycus is part of the parenthesis, to be linked closely with the *kentriskos*, or whether it marks the end of what is in effect a parenthetical note and a return to the general topic of underground generation. I have punctuated in the latter way to avoid suggesting a close connection between Heracleia and the *kentriskos* when that is uncertain. On either interpretation, what is being said here about the region of Heracleia is something different from what was being said in section 7. Pliny (9.177) cites the present passage in connection with fish born from eggs in the mud (in fact conflating what is said in section 9 with what follows in section 10; see below), and mentions the Lycus, but does not refer in this connection to the *kentriskos* or the eel.

The *kentriskos*, if indeed it is a genuine name of a fish at all, has not been identified (D'Arcy Thompson 107). *Kestreus* is a name for the grey mullet, *Mugil* (D'Arcy Thompson 108-110). *Kestrinos* appears with the same meaning in the *Suda* (s.v., t.3 p.103.22 (no. 1433) Adler; v.1. *kestraios*): "kind of fish; but it should be considered whether it differs from *kestreus*"; cf. Athenaeus 7.79 307F; D'Arcy Thompson 110. Schneider in our passage conjectured *kestriniskos*, as a diminutive of *kestrinos*, in place of *kentriskos*. The only other occurrence of *kestriniskos* is in Clearchus, and it will be familiar enough though not exactly helpful; according to Clearchus, the *exōkoitos* is the same size as the *kestriniskos* (Athenaeus 8 332CD = Clearchus fr. 101 Wehrli. See above on section 1.)

The crucial point about Theophrastus' *kentriskos* is not its breathing air, nor yet its being found underground, both of which could apply to the snake-head mullet (see above on section 2), but its being spontaneously generated. Aristotle refers

to a type of *kestreus*, along with the eel, as being spontaneously generated (Aristotle, *HA* 5.11 543b16, *GA* 3.11 762b23; cf. Athenaeus 7.77 306F; D'Arcy Thompson, 108). At *GA* 2.5 741b1 Aristotle refers to eels and one sort of *kestreus* as lacking the distinction between male and female. Whatever the species in question, it seems likely that Schneider was right in proposing *kestriniskos* for *kentriskos* here, and that what Theophrastus says here is a reflection of what Aristotle says about the *kestreus*.

these are left behind] to what does *enkataleiphuhenta* in line 74 refer back? The reference could be a loose one to fish of the type just mentioned, but it seems more likely that it should be to the eggs or the generative principles, or both, mentioned in section 8, for it is those, strictly speaking, that are "left". The generative principles have been mentioned more recently, and the intervening material at lines 72-3 refers to fish generated spontaneously rather than to those from eggs; also the statement that what is left behind "takes shape" (*apomorphoutai*) might seem to fit spontaneous generation better than eggs. However, the participle *enkataleiphuhenta* does not agree grammatically with the "principles" referred to earlier, since the participle is neuter but the word for "principles", *archai*, is feminine. And the reference to eggs at line 77 of section 9 seems out of place if the discussion from line 72 onwards is concerned *only* with spontaneous generation. "Taking shape" is not as inappropriate for eggs as it might seem, since for Aristotle fish, unlike birds, lay *imperfect* eggs which develop further between laying and hatching (Aristotle, *Gen. Anim.* 2.1 733a20). Moreover, *enkataleipein* is linked with both eggs and "principles" not only in line 70 but also in line 90 of section 11, referring back to the present passage. So it seems most likely that lines 74-9 of section 9 are concerned with both types of generation mentioned in lines 69-72 of section 8, both generation from eggs and spontaneous generation from inanimate principles; the neuter plural *enkataleiphuhenta* can then be explained as referring loosely to both eggs and principles. Pliny seems to have taken the passage as at least including generation from eggs; at any rate, in a passage (*NH* 9.177) closely based on sections 9 and 10 of the present Theophrastean work, he refers to eggs such as tortoise eggs maturing in the ground.

take their shape, and remain there] If the reference is to eggs as well as to generative principles, such fish can hardly be typical examples of their species, since the reference to eggs left behind by retreating moisture implies that the normal habitat of the fish is in water, and probably also that they are able to move around and mate (unlike the fish generated underground in places not flooded by water, to be discussed in section 11).

10 The ability to remain in air is not possessed by these (fish) at all] Pliny conflates the fish generated underground in section 9 and those that come on land to seek for food in section 10, even though Theophrastus mentions the latter expressly to distinguish them from the former.

The narrowness of their gills] Pliny loc. cit. refers to the fish walking with

their gills to seek food (*circa eandem Heracleam Lyco amne decedente ovis relictis in limo generari pisces qui ad pabula petenda palpitent exiguis branchiis*). Theophrastus in section 10 simply mentions the narrowness of the gills, to prove that the fish in question can survive out of the water, because they do not need much cooling, comparing them to the eel; but in section 2 (reported by Pliny just before at 9.175) he has mentioned fish in the region of Babylon that search for food by walking on their fins, and Pliny has seen that the present passage refers to the fish feeding on land mentioned there. But Pliny substitutes gills for fins as the means of locomotion. Theophrastus in section 2 actually said the *gills* were like those of other fish.

11 fish which are dug up in Paphlagonia] Strabo cites Eudoxus as referring for this to dry places in Paphlagonia which he did not specify, and to moist places around the Ascanian lake beneath Cius. These fish in Paphlagonia are mentioned by other ancient sources too, including Pliny, who attributes to Theophrastus the view that there is present (in the places in question) a supply of water like that in wells, and then complains that fish are not found in wells. The comparison with wells is in fact Pliny's own; but the fact that fish are not generated in wells is not an unreasonable difficulty to raise against Theophrastus' theory. No doubt he could reply by emphasising that the underground generation only occurs when both the moisture and the place in question are exactly right. Voss, cited above on section 7, adds that, before interpreting Theophrastus in this way, Pliny should have realised that fish that are dug up are found near the surface, and that nothing is generated in wells or deep places. Theophrastus does refer to fish dug up "from a considerable depth", but the term is a relative one, not necessarily implying anything as deep as a well. Hora 1932B 200 refers to a situation in which fish and crabs had buried themselves in the mud and he dug down four feet, finding crabs but no fish; he concludes "presumably fish burrow to a much greater depth."

D'Arcy Thompson 96 suggests that these fish, unlike the types mentioned previously, may be true fossils. However, Theophrastus describes the fish as "fine" (*agathoi*), which seems to imply "fine to eat" more naturally than "fine fossil specimens".

many fine fish are dug up there] On the readings in A cf. Schneider vol.5 176.

12 and it is more reasonable] Presumably, more reasonable than the reverse, that these fish should *not* have water as their natural element.

both for those that are dug up and for the others] "Those that are dug up" will presumably be the fish of sections 8, 9 and 11 that are generated underground, that is those of type (IV), for those that burrow underground to escape drought (type (III), section 7) are already accounted for in the previous sentence, and clearly do have water as their proper element. What then are "the others"? The end of the passage seems to suggest that they are distinct from those that actually breathe air. Perhaps then they are the creatures of type (II) that go on dry land out of

their natural element, but without actually taking in air instead for cooling. Creatures of type (I), that do take in air, will be mentioned in the final sentence, "some use air for cooling, as was said earlier"—i.e. in sections 1-3.

for the former without qualification] *tois men ... tois de* in line 104 could be translated "in some cases ... in others", or "for the former ... for the latter". The latter would imply that moisture is the natural element without qualification for the fish of type (IV) that are generated underground, while those of type (II) that go ashore dualize in respect of their natural element. This is reasonable enough; for even in the case of the fish spontaneously generated underground in Paphlagonia in section 11 Theophrastus stressed the importance of moisture being present in the place.

a double way of life, according to Democritus] The point of the reference to Democritus seems to be that he originated the term *amphibios*, "having a double life" (so Liddell-Scott-Jones s.v. *amphibios*), where Aristotle rather uses "dualize", *epamphoterizein*.

And this happens in other cases too; for some use air for breathing] The fish that use air for breathing are those of type (I) mentioned in sections 1-3. "Other cases too" then suggests that fish of type (I), as opposed to type (II), were not included among the "others" that have a double way of life in line 104. This may seem odd, since the claim that water is the natural element needs to be qualified for those of type (I) even more than for those of type (II). Theophrastus may be presenting us with an *a fortiori* argument—if even type (I) cases have water as their natural element, albeit with qualification, those of type (II) certainly will. But the claim that type (I) creatures *do* have water as their natural element is not made explicit, if they are referred to only in the present final sentence. It was to creatures of type (II), rather than type (I), that Theophrastus referred back in mentioning smallness of gills in section 10 (cf. section 4; though in actual fact the taking in of air as by type (I) is generally accompanied by a reduction in size of the gills, Carter 69). Perhaps the answer is that the creatures of type (I) are in Theophrastus' mind extreme and exotic cases less central to his argument than those of type (II), even though they make an impression on the reader by their position and their oddity.

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384 Theophrastus

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Index of Ancient Sources

ACHILLES TATIUS		1.5	90n.109, 110
<i>Isagoga excerpta</i>		1.5.3	109n.166, 110
8	90n.108 & 110	1.7	71n.33, 80n.69, 88n.95,
19	125, 135f., 138		91n.117, 92, 106n.155, 110
29	107n.157	1.7.7	110
ADAMANTIUS		1.7.8f.	91n.115
<i>De ventis</i>		1.7.34	91n.117
29.13-16 Rose	278	1.9	93
37.15ff.	279	1.15.3	27n.18
AELIANUS		1.18	86, 90n.106 & 110
<i>De natura animalium</i>		1.18.3	90n.107
5.2	360	1.18.5	90n.107, 90-1n.111
5.29	57n.17	1.24	92
7.7	309, 310, 336	2	94n.124, 134n.72
9.36	360, 368	2.1	81n.72, 84n.88, 86,
9.41	370		90n.109
9.45	362, 372	2.1.2-3	84n.88
13.6	372	2.1.3	90n.108
17.10	375	2.2	79n.66, 80n.71, 92,
AESCHYLUS			94n.122
<i>Prometheus vincitus</i>		2.2.1	105n.155
457	315	2.3	80n.70, 91n.115
AËTIUS		2.4	72-3n.37, 106n.155
<i>Placita philosophorum</i>		2.4.15ff.	93
proem 1.3	73n.38, 86,	2.7	89n.105
	90n.106 & 108, 91n.113	2.7.7	107n.156
1.1	92	2.8	92
1.2.2	109	2.9	86, 90n.106
1.3	109	2.9.2	90n.107
1.3.3	109	2.9.3	90n.110
1.3.4	109	2.13	92
1.3.20	74n.41	2.14.2	106n.155
		2.16	100
		2.16.2-3	100
		2.20	80n.68, 85n.89, 92,
			93, 130, 138-40

2.20.1-4	114	3.9.4-5	109n.162
2.20.4	85n.89	3.9.5	103
2.20.6	104n.151	3.10	80n.66, 94n.120, 95n.127, 104
2.20.8	104n.151	3.11	92-3, 95n.125, 106
2.21	80n.66, 85n.89, 93, 104n.151	3.11.1	106
2.22	92-3, 94n.122	3.11.2	106
2.23	93	3.11.3	106-7, 107n.157, 108
2.24	71n.30, 92-3, 94n.120	3.11.4	95n.124, 107n.157
2.24.8	101	3.12	107
2.25	92	3.13	95n.126, 107
2.25-7	93	3.13.1	107
2.26	93	3.13.2	107
2.27	92, 94n.122	3.13.3	101, 101n.145, 107, 108, 108n.160
2.28	93	3.14	95n.124, 107n.157
2.29	92-3, 115	3.15	94n.124, 109n.164
2.30	93	3.15.1	281, 299
3	70, 93, 94n.124, 104n.150, 306	3.15.3	281, 299
3.3	109, 302	3.15.4	104n.154
3.3	303	3.15.7	109, 277
3.3.1	272, 302	3.15.8	109, 277
3.3.3	272, 302	3.15.9	109
3.3.4	301	3.15.10	103n.150, 109
3.3.5	272, 301	3.15.11	281
3.3.7	272, 301	3.17	92
3.3.8	301	3.18	296
3.3.9	272	4-5	65, 65n.12
3.3.11	273	4.1.1	88n.98
3.3.12	273, 301	4.2-7	75-6n.50, 88n.94, 93
3.3.13	272-4, 301-2	4.3	92-3
3.4	298	4.5	93
3.4.4	276	4.5.1	65n.13
3.5	296	4.9	80n.66
3.7	95n.124, 109	4.10	93
3.7.1	278	4.19.2	289n.171
3.8	95n.124	4.19.3	110
3.9	95, 103, 107n.155	4.19.4	289n.171
3.9-15	93-4	4.20.1	289n.170
3.9.1-2	103, 107, 108	5.9	92
3.9.3-4	103	5.9.1	65n.13
3.9.4	106	5.13.2	65n.13

388 Theophrastus

5.14.3	65n.13	62.30ff.	71n.34
5.18	65n.13	63.13-9	71n.34
5.29.2	65n.13	294.14-6	71n.34
5.30.2	65n.13		
11.2	106	AMMIANUS MARCELLINUS	
AËTIUS ARABUS = QUSTĀ IBN LŪQĀ		<i>Res gestae</i>	
2.20 (p.155-6 Daiber)	138	17.7.12-13	282, 299
AIYŪB AR-RUHAWĪ		ANAXAGORAS	
K ^c thāba d ^c simāthā		59A42 DK	301
5.4 (p.204f. Mingana)	174n.20	59A68f.	279
5.5 (p.206)	174n.21	ANAXIMENES	
5.10 (p.215)	174n.22	13A17 DK	321
ALBERTUS MAGNUS		ANONYMUS LONDINENSIS	
<i>De animalibus</i>		col.9.22-42	66n.15
24.22 (p.1522.11-16 Stadler)	360	col.14.11-18.1	66n.15
24.52 (p.1533.32-5)		col.18.8-19.1	66n.15
	364, 377	col.23.42ff.	66n.15
<i>Meteorologica</i>		ARATUS	
2.29 (vol.4 p.533a6-b11 Borgnet)	377	<i>Phaenomena</i>	
ALEXANDER APHRODISIENSIS		266	318
ap. Simplicium, <i>In Aristotelis De caelo</i>		805-10	325
511.15ff. Heiberg	95	880-9	330
523.30ff.	97n.135	1082-5	332
<i>In Aristotelis Metaphysica</i>		ARISTOPHANES	
31.7f. Hayduck	65n.10	<i>Nubes</i>	
174.3	6n.18	375ff.	272, 288
<i>In Aristotelis Meteorologica</i>		383	301
142.21ff. Hayduck	296	404ff.	272, 288, 302
<i>In Aristotelis De sensu</i>		<i>Vespae</i>	
22.8ff. Wendland	23	7	22n.6
<i>In Aristotelis Topica</i>		ARISTOPHANES BYZANTINUS	
5. 23 Wallies	5n.13	<i>Historiae animalium epitome</i>	
7.1	5n.13	1.98 (Suppl. Arist. vol.1.1	
7.4	5n.13	29.18-20 Lambros)	351n.14
27.17-18	109n.165	1.98 (Suppl. Arist. vol.1.1	
27. 23-31	4n.11	29.19-21 Lambros)	350n.13

ARISTOTELES

Categoriae

6 5b3 69n.23

8 10a11ff. 69n.24

14 15a14 69n.23

Analytica priora

1.30 46a19 314

2.10 94a2 272

Analytica posteriora

1.1 73, 74

2.1 72, 73, 77, 88n.95,
91n.117

2.1 89b24-35 70-1

2.1 89b32-4 92

2.2 90a14-15 71n.29

2.8-9 34n.7

2.10 34n.7

2.15 98a33 323

Topica

1 85

1.1 100a18-21 3-4, 5n.13

1.1 100a20 109n.165

1.1 100b21-23 6

1.2 11n.42

1.2 101a30 5n.17

1.2 101a35-6 7

1.2 101b1f. 6n.18

1.2 101b16f. 5n.13

1.5 102a18 18

1.5 102a31-2 17

1.5 102a35f. 17

1.6 13-14

1.6 102b34-6 14n.53

1.10 104a15 6n.21

1.10 104a33-7 6n.21

1.11 5n.13, 73, 74

1.11 104a19ff. 81n.73

1.11 104b1-5 8n.28, 14n.56

1.11 104b1-8 72, 73n.39, 74n.42

1.11 104b19-28 6n.21

1.11 104b22-4 15n.57

1.11 104b28 15n.57

1.11 104b35f. 81n.73

1.12 76

1.13 70

1.14 73, 84n.85, 97n.136,
98n.137

1.14 105a34-6 73-4

1.14 105b12-25 73-4

1.14 105b12ff. 12n.45, 15n.57

1.15 106a9ff. 13n.51

4.3 123b1ff. 17

4.3 124a1-2 18

5.2 130b20-1 18

5.3 132b19-21 18

6.6 145b1 155n.36

6.6 145b16-20 155

7.2 110

8.1 155b10-11 5n.15

8.5 159a32ff. 5n.14

8.5 159b8f. 7n.24

8.11 161b16ff. 5n.14

8.14 163a36-b4 5n.15

8.14 163b9-12 7

Sophistici elenchi

34 183a38 5n.13

34 183b8-12 5n.14

Physica

1.2 74n.45

1.2 184b15-21 75

1.4 187a12 9n.33

2.2 193b25ff. 94n.120

2.2 193b26ff. 9n.122

2.2 193b27ff. 92

3.1 200b20 152n.27

4.1-5 74n.44

4.1 208a28-9 74n.44

4.1 208b8-25 150n.18

4.1 208b8-26 149

4.1 208b8ff. 147n.13, 149

4.1 208b10-11 147

4.1 208b15 150n.15

4.1 208b15ff. 149n.15

4.1 208b25-7 149n.18

390 Theophrastus

4.1 208b27-8	150n.18	2.13 293a15-17	95
4.1 208b28	148n.13	2.13 293a15ff.	96
4.1 208b29-209a2	150n.18	2.13 293a17ff.	95
4.1 209a2ff.	163n.60	2.13 293a20-b32	99
4.1 209a18-22	150n.20	2.13 293a20	96
4.2 209b17-210a9	150n.23	2.13 293a25ff.	96
4.2 210a2ff.	150n.23	2.13 293b15	95n.130
4.4 210b32ff.	150n.19	2.13 293b15ff.	96
4.4 211a7-11	150n.22	2.13 293b30ff.	107
4.4 211a7ff.	163n.60	2.13 293b30-2	96n.133, 100,
4.4 211a17ff.	153n.30		102
4.4 211a29	153n.30	2.13 293b32	109
4.4 211b1	153n.30	2.13 293b33	104
4.4 211b5ff.	155n.38	2.13 293b33ff.	96
4.4 212a7ff.	144n.6	2.13 293b33-294a1	104
4.4 212a16ff.	164n.66	2.13 293b34	94n.123, 97,
4.4 212a21-30	150n.19		124n.44
4.4 212a22-30	152n.28	2.13 294a9-10	109
4.5 212a31	144n.8	2.13 294a21ff.	97
4.5 212b3	153n.30	2.13 294a28	109
4.5 212b8	145n.8	2.13 294b10-13	97n.135
4.5 212b22ff.	152n.28	2.13 294b13-14	104, 106
4.5 212b29-213a1	152n.28	2.13 294b13-15	109
4.8 214b12ff.	151n.24	2.13 294b13ff.	95n.131, 97
4.8 214b28ff.	151n.24	2.13 294b15	94n.123
4.8 215a1	277	2.13 294b25	97
4.8 215a6ff.	151n.24	2.13 294b30ff.	97
4.8 216a15.25ff.	276	2.13 295a9, 14	103
<i>De caelo</i>		2.13 295a9ff.	98
1-2	94	2.13 295a13	94n.123
1.7-8	84n.88	2.13 295a15	98
1.7 275b17ff.	152n.27	2.13 295a16ff.	98
1.8 276b4-5	152n.29	2.13 295a29-30	110n.170
1.9 278b30-2	152n.29	2.13 295b11ff.	98, 109
1.10	110	2.14 297b23ff.	104n.153
1.10 297b3-6	72n.37	4.3 310b34-5	150-1n.23
2.4 287b1-6	278	<i>De generatione et corruptione</i>	
2.7 289a20-9	273, 274	1.1	9n.33
2.8 289b4-7	101	1.10 327b25-6	42
2.10 291a29-32	313-14	1.10 328a28-31	42n.17
2.13	69n.25, 94, 103,	2.1 338a23-4	74n.45
	107n.157, 108, 109, 111	2.7	9n.33

Meteorologica

1.2	272	2.4 360a27ff.	278
1.3 340a29ff.	276	2.4 360b16	275
1.3 340b31-2	276	2.4 361b1-5	274
1.3 340b37-8	321	2.5	94n.124, 107-8n.157
1.4-8	305	2.5 361b23-36	315
1.4 341b36ff.	297	2.5 361b30-3	308
1.4 342a10ff.	279	2.5 361b35-6	314
1.6-7	9n.33	2.5 362a32ff.	95n.124, 107n.157
1.7 344a16ff.	297	2.5 362a35	104n.153
1.7 344b19-20	309	2.6 364b3-365a10	335
1.8 345b10	297	2.7-8	95n.124, 290n.176, 298, 299
1.9-12	305	2.7 365a14ff.	104
1.9 346b32-3	275	2.7 365a20ff.	299
1.9 347a9ff.	277	2.7 365b1ff.	299
1.10-12	277	2.7 365b1-6	281
1.10 347a16f.	278	2.7 365b7ff.	299
1.10 347a18ff.	278	2.8 365b26	281
1.11 347b14ff.	278	2.8 366a4-12	281
1.11 347b18f.	275	2.8 366a7f.	281
1.11 347b23	298	2.8 366a23-366b1	281
1.11 347b24	278	2.8 366b18f.	282
1.12 347b36f.	278	2.8 366b22-4	282
1.12 347b37-348a2	317	2.8 366b31-367a6	282
1.12 348a25ff.	298	2.8 366b32f.	282
1.12 348a34-6	278	2.8 367a9-11	281
1.12 348b2	275	2.8 367b20	323
1.12 348b16ff.	298	2.8 367b26	316
1.12 348b18	278	2.8 368a22-4	274
1.13-2.3	305	2.8 368b22ff.	291n.182
1.13 349a16ff.	278	2.8 368b23ff.	292, 299
1.13 349a32ff.	304	2.8 368b28f.	282
1.13 350a7	273	2.8 368b30	299
2.3 358a21ff.	275	2.9	288
2.3 358b7	374	2.9 369a10ff.	300
2.3 359a5	373	2.9 369a12ff.	303
2.4-6	94n.124, 288	2.9 369a16ff.	274
2.4-3.1	305	2.9 369a22ff.	279
2.4 359b34ff.	278	2.9 369a28-9	272
2.4 360a10	275	2.9 369a35-b1	272, 287n.158
2.4 360a10ff.	274	2.9 369b1ff.	300
2.4 360a10-12	278	2.9 369b3-4	274

392 Theophrastus

2.9 369b5ff.	302	2.3 414b16-19	46, 53
2.9 369b7-11	223n.92, 274	2.4 416a29-b9	31
2.9 369b10ff.	302	2.5	31n.28
2.9 369b12ff.	301, 302	2.5 416b32	10n.37
2.9 369b15ff.	272	2.5 417a18-20	31
2.9 369b17ff.	302	2.6 418a7ff.	10n.37
2.9 370a5ff.	272	2.8 420b7	289n.170
2.9 370a24	301	2.11 424a7-10	34n.8
2.9 370a24ff.	301	3.3	12n.46
2.11 354b33f.	128n.61	3.3 427a21-9	31n.27
3.1 370b17ff.	279	3.3 429a6	10n.37
3.1 371a5	275	3.4	32-43, 33n.3, 37n.11
3.1 371a20ff.	274	3.4 429a10-12	35n.9
3.1 371a24-9	275	3.4 429a15	34n.8
3.1 371a26ff.	303	3.4 429a18	36
3.2-3	199n.38, 289	3.4 429a21-2	34, 42n.18
3.2-6	305	3.4 429a23-4	34n.8
3.3	280, 296	3.4 429b3-5	34
3.3 372b20-2	308, 312	3.5	33n.3
3.3 373a2ff.	296	3.5 430a10-14	38
3.4-5	296	3.5 430a16-17	39
3.4 373bff.	296	3.5 430a18	34n.8
3.4 373b10-12	336	3.5 430a22	42n.19
3.4 374a20-1	336	3.5 430a23-4	34n.8
3.6 377a29ff.	297	3.5 430a24-5	34n.9, 35
3.6 377b23-7	308	<i>De sensu et sensibilibus</i>	
4.7 384b15-17	276	1 436a17-b1	66n.14
4.9 386b5ff.	273	1 437a1	12n.46
4.9 386b16	273	2 437a28f.	16n.64
<i>De anima</i>		2 437b9-438a5	26n.17
1.1	75n.50	2 437b11-12	96n.133
1.1 402a23-5	75n.50	2 437b23ff.	23n.8
1.1 402a6-7	75-6	<i>De respiratione</i>	
1.1 402b5	7n.25	8 474b19ff.	352n.16
1.1 402b13	12n.46	9 474b25ff.	352n.16
1.1 403b28	12n.43	9 475b5ff.	353
1.2ff.	76	11 476b15-30	352n.18
1.2 403b20-4	7n.25	11 476b30-477a7	352n.18
1.2 403b21-4	75n.46	12 476b30	372
1.2 404a10	74n.45	13 477a15	355
1.2 404b16-18	31n.27	14 477a32ff.	355
2.3 414a29-414b3	46, 53	21 480b23-30	66n.14

Historia animalium

1.1 487b1	354n.22
1.1 488b13	52
1.1 488b28	52
4.1 524a9	372
5.3 558a8	370
5.3 558a11	370
5.10 543a28	372
5.11 543b16	380
5.11 543b18-20	317
6.12 566b27	353n.19
6.15 569b3-4	318n.14
6.16 570a15ff.	378
6.21 575b17-19	308
8-9	44-5, 47
8.2 589a16	352n.18
8.2 589a23	354n.22
8.2 589a27	352
8.2 589b20	372
8.2 589b24	354
8.2 590b6-7	370
8.2 592a5	366
8.2 592a17	375
8.13 598a14	372
8.13 598a24	375
8.24 605a13	352n.17
8.28 606a10	375
9.6 612b4-8	336
9.10 614b20-1	308
9.37 622a31	362, 372
9.40 627b10-13	308

De partibus animalium

2.2 648a3-11	50
2.4 650b24-7	50
3.6 668b35ff.	352, 352n.16
3.6 669a9	352
4.13 696b21	372
4.13 697b1	353n.19

De generatione animalium

1.23 731a31-b4	50-1, 52
1.23 731a32-b3	61
2.1 732b32ff.	355n.28

2.1 733a20	380
2.2 735b2	224n.96
2.2 735b21	222n.75, 277, 298
2.4 738a20-2	323
2.5 741b1	378, 380
3.11 761b3ff.	373-4
3.11 761b9	373-4
3.11 762a27	373
3.11 762b21	378
3.11 762b23	380
3.11 762b24-8	372
4.1 765a25	123
4.10 777b21-2	324
4.10 777b26	323
5.3 784a18-19	317

Metaphysica

1.1 980a27-69	49-50
1.2 982b24-983a11	280
1.3 983b32-84a2	75n.46
1.7 988a22ff.	7n.25
1.7 988b17	7n.25
2.1 993b3-4	7n.25
2.4 1000b3-9	28n.21
3.1 995a24ff.	8n.29, 11n.42, 15n.58
3.5 1009b12-15	28n.21
13.1 1076a16f.	9n.33, 11-12, 12n.43

Ethica Nichomachea

1.1 1095a6	73n.38
1.2 1095a18ff.	74-5n.46
1.2 1095a29-30	75n.46
1.4 1095b6ff.	72
1.4 1096a17	75n.46
1.5 1097a15f.	73n.40
1.8 1098b9-11	75n.46
1.8 1098b16-18	75n.46
2.2 1103b26ff.	73n.38
6.2 1139a19-20	52
6.7 1141a26-8	49-50
8.11 1161a32-b3	55n.14

394 Theophrastus

<i>Ethica Eudemia</i>		4 395a15-17	273
7.5 1239b19-21	48	4 395a16	274
7.5 1239b29-34	48	4 395a23-4	274
7.5 1239b40-1240a1	48	4 395a33ff.	296
<i>Politica</i>		4 395b-396a	290f.
1.2 1253a7-18	46n.7	4 395b5	273
2.5 1264a1ff.	7	4 395b30ff.	299
<i>Rhetorica</i>		4 395b33-7	281
1.1 1354a5	5n.13	4 396a2-3	282
1.1 1355a14ff.	7	4 396a4	282, 291
1.2	97n.136	4 396a5	282, 291
1.2 1356b12ff.	76	4 396a9-11	282, 291
1.2 1358a1ff.	76	4 369a1ff.	299
1.2 1358a17ff.	76	5 397a19ff.	281
1.13 1374a22-3	77n.54	5 397a30ff.	281
2.23	76	5 397a31	281
3.16 1416b20-1	76	6 399a12ff.	281
<i>Fragmenta</i>		<i>Problemata</i>	
fr.112 Gigon	71n.34	1.3 859a23	320n.19
fr.112 Rose ³	71n.34	1.17 861a28	320n.19
fr.114 Rose ³	83n.83	1.36 863a31-3	376
fr.115 Rose ³	83n.83	10.13 892a30	325n.29
		12.3 906b5f.	297
[ARISTOTELES]		15.12 912b27ff.	297
<i>Mirabilia</i>		23.6 932a28-9	375
63 835a19-21	364, 378	23.7 932a39b-4	373, 374
68-77	349, 349n.10	23.8 932b8-12	376
71 835b5-7	360, 370	23.10 932b26-7	373
71-4	349n.10	23.13 932b12-13	373
72 835b7-14	360	23.16 933a34	374
73 835b15-22	349n.10, 364, 376	23.20 933b21-9	373, 376
75-7	349n.10	23.38 935b17	373
89 837b11-16	377	25 et 26	225n.105
<i>De mundo</i>		25.2 938a9ff.	272
4	306	25.14 939a38-b4	279
4 394a18	303	25.22	279
4 394a27f.	276	26.7 940b33ff.	275
4 394a33-6	277, 298	26.12 941b14	331
4 394b13ff.	278	26.23	289n.171
4 395a6f.	278	26.26 942b29	318n.17
4 395a12-13	272, 273	26.30 943b11	374
4 395a12-26	302	26.48 945b30-4	279

- De virtutibus et vitiis* 8.2 331D 366
 ap. Stobaeum 3 137.6-148.12 8.4 332A-E 360, 368-70, 377-9
 Hense 82n.80 9.37 387B 351
- ARIUS DIDYMUS
Epitome ethica ap. Stobaeum
 2.41.10-13 Wachsmuth 79n.61
 2.42.1-6 70n.27
 2.42.4-5 86
 2.42.7-10 86
 2.45.8 86
 2.45.11f. 86
 2.53.21ff. 86
 2.56.24ff. 86
Epitome physica
 F11-14 (DG 451-5) 296-9
 F35 (DG 468) 298
- ARRIANUS
Fragmenta ap Stobaeum
 1.235.19ff. Wachsmuth 302
 1.237 302
 1.238.5 303
 1.247.5ff. 298
- ASCLEPIUS
In Aristotelis Metaphysica
 p.140.7 Hayduck 6n.18
- ATHENAEUS
Deipnosophistae
 3.65 105D 348n.6
 7.63 301E-F 348n.7
 7.77 306F 380
 7.79 307F 379
 7.90 312B 348n.3, 351n.15, 362, 372
 7.95 314B-C 348n.6
 7.103 317C 362, 372
 7.104 317F 348n.4 & 6, 362, 375
 8.2 331C 364, 376
- BAR BAHLŪL
translatio breviata Meteorologicorum Theophrasteorum
 1.9 219
 2.4 200n.46
 4.4 172, 200n.44
 6.24-38 199n.38, 200n.42 & 46
 6.37-8 200n.42
 12.1 268n.114
 13.19ff. 200n.41
 13.45 200n.46
 14.9-13 199n.38, 200n.46
 15.4-6 200n.42
 15.17 200n.43
- BARHEBRAEUS
 Ta'rikh mukhtaṣar ad-duwal
 56.1f. 221n.74
- BAYHAQĪ: vid. ZĀHIR AD-DĪN AL-BYHAQĪ
- CATULLUS
Carmina
 4 376
- CELSUS
 7.7.13ff. 22n.5
- CENSORINUS
De die natali
 18.5 322
- CHRYSIPPUS
Artes naturales
 ap. Stobaeum 1.206.25ff. W. 315
De anima
 1 ap. Galenum,
 PHP 3.1.10-15 88-9

396 Theophrastus

CICERO		<i>Tusculanae disputationes</i>	
<i>Academica priora</i>		1.18ff.	87n.90
2.118	95		
2.122	98, 106	CLEARCHUS	
2.122-3	95	fr.101 Wehrli	360, 368, 379
2.123	99, 102, 103, 107	fr.102	362, 372
2.124	86-7, 87n.90, 95n.129		
<i>De divinatione</i>		CLEOMEDES	
2.10	80n.66	<i>De motu circulari corporum</i>	
2.10-11	79n.61, 80n.67	<i>caelestium</i>	
<i>De finibus</i>		1.8 74.1-13 Ziegler	105n.155
5.10	82n.79	2.1 158-62	117n.13
5.12	66n.15		
<i>De inventione</i>		CONSTANTINUS	
1.8	79, 79n.61, 80, 82n.78, 106n.155	PORPHYROGENITUS	
<i>De natura deorum</i>		<i>Aristophanis Byzantii Historiae</i>	
1.2	87	<i>animalium epitome, etc.</i>	
1.35	128	1.98 (p.29.19-21 Lambros)	
1.65	88	350-1, 350n.13, 351n.14	
2.142	23n.9		
<i>Orator</i>		CORNELIUS AGRIPPA	
45	80n.67	<i>De occulta philosophia</i>	
45-6	78	14	377
45f.	81		
46	82n.79	DAMASCIUS	
47	80n.67	ap. Simplicium, <i>In Phys.</i>	
<i>De oratore</i>		639.4-9	161n.57
1.5	79n.64	DAVID	
2.66	80n.66, 82n.78	<i>Prolegomena philosophiae</i>	
3.113-14	78	1.13ff.	70n.27, 71n.28
<i>Paradoxa Stoicorum</i>			
6	80n.67	DEMOCRITUS	
<i>De partitiones oratoriae</i>		68A155b DK	366, 382
61-7	79n.65, 81	68B13	312
62	84		
64	64n.8, 81	DICAEARCHUS	
<i>Timaeus</i>		fr.105 Wehrli	105
37	102	fr.108	105
<i>Topica</i>			
81-2	78	DIODORUS SKULUS	
		<i>Bibliotheca historica</i>	
		12.36	322

DIOGENES LAERTIUS

Vitae

2.9	301
3	70
3.80-109	83
5.3	82n.79
5.26	309, 336
5.28-9	84n.85
5.42	1n.1, 2n.5, 349n.9
5.43	348n.5
5.43-5	310n.4
5.44	272, 348n.6, 378
5.44-6	66
5.45	310, 378
5.46	285, 286
5.48	64, 65n.10
5.49	44, 65n.10
7.47	65n.10
7.151-4	295, 306
7.153	272, 273, 301, 302
7.154	281
8.83	60n.24
10.99-114	305

DIOGENES OENOANDENSIS

fr.8 Chilton	135n.76
--------------	---------

DIVISIONES ARISTOTELEAE

no. 37 (p.52 Mutschmann)	83n.84
no. 42 (p.55-6)	83-4

ELIAS

Prolegomena philosophiae

3.3-6	70n.27, 71n.28
-------	----------------

EMMANUEL BAR SHAHHÄRE

Hexaameron

Memrā 5	174n.25
---------	---------

EMPEDOCLES

31A62 DK	301
31B17	28

31B71	27n.18, 28n.22
31B75	28n.22
31B84	21-5, 23n.8
31B86	20, 21, 28n.22
31B96	23n.10
31B98	23n.10
31B100	279
31B109	27-8, 29

EPICURUS

Epistula ad Pythoclem

99-110	272-81
99	321n.23
100	301, 302
101	302
102	302
104	303
105	300
107	298
109	297
110	296
111	297

EUDEMUS

fr 6 Wehrli	163n.62
fr 73	164n.65
fr.75	151n.26
fr.79a-c	141n.1, 158n.45
fr.80	145n.10, 163n.63 & 64

EURIPIDES

Hecuba

972	22n.6
-----	-------

Ion

876	22n.6
-----	-------

EUSEBIUS

Praeparatio evangelica

1.8.4	125
15.23	138
15.26.1-7	114

398 Theophrastus

GALENUS

De alimentorum facultatibus
3.29 (CMG vol.5.4.2 369.10-12) 374

*De animi cuiuslibet peccatorum
dignatione et curatione*
ch. 3 52.13-14 Marquardt
= 46.23-4 DeBoer 89n.105
ch. 7.80.3-12 Marquardt
= 67.6-20 De Boer
90n.108, 91n.111

De locis affectis
3.5 92n.119

De placitis Hippocratis et Platonis
3 1.10-15 88
4 1.14-17 88
8 89
9.5.11ff. 88n.99
9.6.1ff. 88n.99
9 6.21-2 89-90, 91n.114
9 7.9-13 91

De usu partium
10.3 23n.8

*In Hippocratis De aere
commentarii* 276

*In Hippocratis aphorismos
commentarii*
14 (vol.17.2 p.405.3 Kühn) 378

*In Hippocratis De natura hominis
librum commentarii*
1.2, 15.22ff. 136n.80

[GALENUS]

Historia philosopha
18 75n.49
62 114, 138
74-89 306

GEMINUS

Isagoge
17.49 Manitius 308

[GEMINUS]

Calendarium
211-33 Manitius 312
212 319
214 318n.14, 319
216 319, 320n.21
218 320n.21
220 320n.21
222 319
226 319
228 319, 320n.21
230 317n.13, 318n.14, 320n.20
232 319, 320n.21

HERACLIDES

fr. 105 Wehrli 101n.144
fr.106-8 101

HERACLITUS

Allegoriae
38.6 299

HERMAGORAS

fr 6a Matthes
ap. Cic., De inv. 1.8 79n.61,
81n.74
fr.7 Matthes
ap. 'August.' Rhet. 141.8ff.
79n.62
fr.13 Matthes
ap. Quint. 3.6.56 81n.77
fr.14b Matthes
ap. 'August.' Rhet. 142.15ff.
81n.77

HERMOGENES

Progymnasmata
25.3ff. Rabe 80, 84n.88

HERO

Pneumatica
24-6 289n.173

- HERODOTUS
3.28.2 351n.14
- HESIODUS
Opera et Dies
383 316, 319
384 316
417-19 317
564-7 314, 316, 319
564-70 318
567 316, 319
587 317, 319
597-9 314, 316, 319
610 316, 319
614-17 314, 316, 317
619 316
619-21 316
- HESYCHIUS
Lexicon
s.v. Ἀριστοτέλης (Rose³, *Arist. qui fer. lib. fr.* p.14.99) 309, 336
- HIPPO
38A11 DK 66n.15
- HIPPOCRATES
De aëre
2.34 Littré 276, 321
De affectibus interioribus
7.284.16 Littré 22n.7
Aphorismi
3.12 25n.16
3.14 25n.16
De carnibus
8.606.7 Littré 22n.7
8.606 25
8.606.10ff. 24n.11
De flatibus
14.101.6 277
- De locis in homine*
2, 6.278.23-280.2 Littré 24n.12, 25n.16
2, 6.280.5-6 24n.11
- [HIPPOCRATES]
De aëre aquis et locis
1-9 333
- HIPPOLYTUS
Refutatio omnium haeresium
1.14.3 Marcovich 125
10.6.2-7.6 75n.49
- HOMERUS
Ilias
5.5 318n.14
Odyssea
9.391 272, 288
- HORATIUS
Sermones
2.5.72-6 79n.61
- IBN ABĪ UṢAIBIʿA
ʿUyūn al-anbāʾ
1.69.24 Müller 221n.74
1.170.29 174n.24
- IBN AL-KHAMMĀR
Maqāla fī l-āthār al-mutakhayyila fē l-djauw 221n.69, 269n.116
- IBN AN-NADĪM
Fihrist
252.7 Flügel 2121n.74
265.9 221n.71
- IKHWĀN AṢ-SAFĀʾ
Rasāʾil
2.55-67 Ziriklī 223f.
2.63.2ff. 223n.84

400 Theophrastus

IOANNES LYDUS		6.121ff.	302
<i>De magistratibus</i>		6.121-36	272
3.63	350	6.145ff.	301
<i>De Ostentis</i>		6.145-9	272
2.6A	309	6.156-9	272
53-4	299	6.160ff.	302
		6.160-3	273
JACOB BAR SHAKKŪ: vid.		6.164-72	274
SEVERUS BAR SHAKKŪ		6.167ff.	302
		6.175ff.	302
JOB EDESSENUS vid. AIYŪB AR-		6.194ff.	272
RUHAWĪ		6.204-28	273-5
		6.246ff.	302
JOSEPHUS		6.271ff.	274
<i>Contra Apionem</i>		6.277ff.	302
1.166-7	56n.16	6.295-308	274
		6.348-78	274-5
KINDĪ		6.423ff.	303
<i>Rasā'il</i>		6.426ff.	279
2.70ff. Abū Rīda	222n.75	6.495-512	275
		6.536ff.	300
LUCANUS		6.536-47	281
<i>Pharsalia</i>		6.552-90	281-2
7.513	303	6.591ff.	282
LUCIANUS		LYSIAS	
<i>Icaromenippus</i>		<i>In Eratosthenem</i>	
8	90n.105, 91n.,113 & 115	94	313
		<i>In Philocratem</i>	
LUCRETII		8	313
<i>De rerum natura</i>		MACROBIUS	
1.705-15	75n.49	<i>Commentarii in Somnium Scipionis</i>	
2.22.2	273	1.15.4	297
5.596-613	135n.76		
6	294, 301	MANUEL PHILES	
6.50-916	305	<i>De animalium proprietate</i>	
6.96ff.	301	85 1532	348n.7
6.96-101	272	113 (97) 1913-18	371
6.108ff.	272	114 (98) 1919-1944	360, 368
6.116ff.	301		
6.116-20	273		

MARTIANUS CAPELLA	4.264-307	362, 372
<i>De nuptiis Philologiae et Mercurii</i>		
6.590-5	105n.155	
MELA, POMPONIIUS	OVIDIUS	
<i>De Chorographia</i>	<i>Metamorphoses</i>	
2.5.83	2.728	303
	14.825	303
	<i>Tristia</i>	
	3.10.47	364
MOSES BAR KEPHA	PHILEMON	
<i>Hexaemeron</i>	fr. 99 Kock	313
fragmenta Syriaca Meteorologicorum Theophrasteorum 13-15		
168, 171n.12	PHILO	
	<i>De somniis</i>	
NICOLAUS DAMASCENUS	1.30-3	87
<i>De plantis</i>		
176f. Drossaart Lulofs	276	
186f.	225n.103, 276, 277	
188f.	225n.103, 277	
OLYMPIODORUS	PHILO OF LARISSA	
<i>In Aristotelis Meteorologica</i>	ap. Stobaeum, <i>Anthologium</i>	
80.30-81.1 Stüve	241.10-13 Wachsmuth	79n.61
80.30		
97.5-17	PHILOLAUS	
97.6-7	44A27 DK	66n.15
102.1-3		
175.6-11	PHILOPONUS	
175.7	<i>Adv. Proclum</i>	
178.4-7	13.15 Rabe	127n.56
210.15ff.	68.27	110
	145.20-1	64n.9
	<i>In Aristotelis De generatione et corruptione</i>	
	93.14 Vitelli	276
OPPIANUS	PHOTIUS	
<i>Halieutica</i>	<i>Bibliotheca</i>	
1.155-67	278	57-8
1.174	278 525a33-6	348n.6
1.307-11		
1.397	PLATO	
1.513-21	<i>Meno</i>	
1.556	76C-D	25
1.609	76C10	29n.24
2.199-224		

402 Theophrastus

<i>Phaedo</i>		9.177	364, 379-80
97D-E	94n.123	9.178	366, 381
99B-C	94n.123	18.231	322n.26
<i>Protagoras</i>		18.280	325
315C	314	31.26	348n.7
<i>Respublica</i>			
7.530A	314	PLUTARCHUS	
7.531A	314	MORALIA	
<i>Symposium</i>		<i>De primo frigido</i>	
188B	314	14 951B	276
<i>Theaetetus</i>		15 952A	277
174A	314	16 952AB	378
<i>Timaeus</i>	26, 66n.15, 96, 99, 100, 102	18 953C	378
40B-C	96n.133, 100, 101n.144	<i>Quaestiones convivales</i>	
40B8	102n.147	2.3 637F	378
45C	30	4.2 665F	274
51B	313	6.6 691F	277
55C-D	84n.88, 107n.155	<i>Quaestiones Graecae</i>	
61b7	134n.75	7	310n.4
67C-D	30	7 292C	272
68A	24n.12	7 292 C-D	277, 286n.143
		<i>Quaestiones naturales</i>	
		19 916B	348n.6
PLINIUS		<i>Quaestiones Platonicae</i>	
<i>Naturalis Historia</i>		8, 1006C	99, 100
2.112-13	272, 273, 302	VITAE	
2.131-4	279	<i>Numa</i>	
2.135f.	303	11 67D	99
2.137	275		
2.142	274, 302	[PLUTARCHUS]	
2.145	274	<i>De placitis philosophorum</i>	
2.150	296	1 prooem	70, 84, 124
2.162	105n.155	1.3.10	122n.41
2.192	299	1.7.1	122
9.52	375	1.7.4	119
9.70	368	1.9.4	119, 120n.34
9.71	360, 362, 370, 372	1.11	124n.46
9.76	372	1.11.3	119
9.160	378	1.15	133n.71
9.166	370	1.18	122
9.175	360, 381	1.18.5	119
9.176	364, 376	1.20.1	119

1.21.2	120n.33	<i>Stromata</i>	
1.23	65	ap. Eusebium, <i>PE</i> 1.8.4 Mras	125
1.25	122		
1.25-9	124	POLYBIUS	
1.27	122	<i>Historiae</i>	
1.28	122, 123	34 fr.10 Hultsch	
1.28.3	120n.33, 122	= Athenaeus 8.332AB	377
1.29	124		
1.30.1	122	PORPHYRIUS	
1.43	123	<i>De abstinencia</i>	
2.1	133n.71	2.5-22	52-4
2.2	135n.76	3.25	54-5
2.4	135n.76		
2.4.1	119	POSIDONIUS	
2.11	122	<i>Fragmenta</i>	
2.11.3	119	F11-12 EK	298, 299, 300
2.12	133n.71	F15	296
2.13	130n.69, 133n.71 & 74, 134, 135n.76	F18	304
		F97	90n.110
2.18.1	121	F121	297
2.19	122	F129-34	296-7
2.20	112-140	F135	300-2
2.24	133n.71	F136	298
2.24.4	132	F230	299
2.28.1	119	T41	300
2.29	123, 124		
2.31	133n.71	PRISCIANUS LYDUS	
3.1ff.	306	<i>Metaphrasis in Theophrastum</i>	
3.3.5	119	26.1-6 Bywater	33, 34, 36, 38
3.4	123, 128n.62	27.32	39n.12
3.8	120	28.16-25	39n.12
3.11.3-4	107	29.12-15	33, 39
3.13.4	108n.162	31.8-13	39, 40
3.15	106, 133n.71, 135n.76		
3.17	123	PROCLUS	
4	65	<i>In Platonis Timaeum</i>	
4.2.1	120n.33	1.120.25 Diehl	276, 321
4.8-9	133n.71	2.120.29	297
4.13.2	119	1.121.1	275
5	65	2.121.3	272, 284n.129
5.7	123	2.122.15	128n.60
5.20.1	123	4.281	101n.144

404 Theophrastus

PTOLEMAEUS		1.2.1-7	280
<i>Almagest</i>		1.3.2	289n.171
1.4	105n.155	1.5	297
3.1	322	1.11ff.	297
		2.4	302
QAZWĪNĪ		2.8	300
<i>ʿAdjāʿib al-makhlūqāt</i>		2.12-15	300-2
139.14-144.1 Saʿd	223f.	2.12.6	274
141.12f.	223n.83	2.15-16	273-4
		2.17-18	300-2
QIFṬĪ		2.17	272
<i>Taʾrīkh al-ḥukamāʾ</i>		2.21.2	274
107.3 Lippert	221n.74	2.22-4	274
		2.22.1	284
QUINTILIANUS		2.22.1-23.2	273
<i>Institutio oratoria</i>		2.27-8	300-1
3.5.5	80	2.27.1	272
3.5.6	80n.70	2.27.3	273
3.6.23-4	77-8, 78n.55	2.27.4	272
3.6.49f.	77	2.28	273
3.6.56	81n.77	2.28.1	272
7.2.6	79n.61, 81n.72	2.28.2	273
7.4.1	79n.61, 81n.72	2.29.1	272
		2.30	301
SCHOLIA IN BASILII		2.31.1	275
HEXAEMERON		2.40.1	274
200.4-5 Pasquali	83n.81 & 83	2.42ff.	281
201.2-3	99n.141	2.52.1	275
201.3-6	102n.147	2.54	300
		2.57.2	274
SCHOLIA		2.57.3	303
<i>In Arati Phaenomena</i>		2.58.3	303
752	312, 313n.7	3.11.2, 4-5	298n.2
811	296-7	3.11.3	286n.145
1095	309-10, 336	3.16.4-5	298n.2, 348n.8,
<i>In Aristophanis Aves</i>			364, 377
997	322	3.19.1-4	348n.8
		3.19.3	378
SENECA		3.25.4	298n.2
<i>Naturales quaestiones</i>		3.25.7	298n.2
1-7	305	3.26.1	298n.2
1.2	296	4.2.16	298n.2

4B.3.3-4	298	<i>In Aristotelis De caelo</i>	
4B3.3	277	444.32ff. Heiberg	101
4B.3.5	278, 298	517.6ff.	101
4B13.2	277	519.9ff.	101
5.1ff.	278	541.27ff.	101
5.12-13	272	547.6.25	104n.153
5.13.3-4	279	<i>In Aristotelis Categorias</i>	
6.2-3	281-2	118.9-10 Kalbfleisch	155n.36
6.5.1	299	<i>In Aristotelis Physica</i>	
6.6	299	47.22 Diels	6n.18
6.9ff.	292n.185	523.22ff.	164n.65
6.9	299	532.33ff.	151n.26
6.9.1	281	533.14-17	151n.26
6.10	299, 300	566.18	141n.1
6.12	299	583.7ff.	141n.1
6.13.1	282, 292n.183, 298n.2	583.10	158n.45
6.16ff.	299	595.6-9	145n.10, 163n.63
6.20.1	299	595.8-15	163n.64
6.20.5-7	281	600.13ff.	163n.60
6.21	299	601.14-25	156n.38
6.21.2	282, 291, 299	601.15ff.	160n.54
6.22	291, 300	601.20	155
6.22.2	282, 292n.183	604.5-11	144n.7
7.22	297	606.32	141n.1
7.28.2	309	606.33	158n.45
7.28.3	298n.2	612.5	158n.45
SEVERUS BAR SHAKKŪ		618.6ff.	160n.54 & 55
<i>K*thābq da-s'yame</i>		639.4-9	161n.57
321f.; 325-7 Nau	174n.27	639.12	160n.51
		639.13-15	156
SEXTUS EMPIRICUS		639.13-22	141-65, 147n.11
<i>Adversus mathematicos</i>		639.22	158n.42
9	80n.70	639.31ff.	158n.43
9.49ff.	88n.95	640.9-11	158n.44
9.359-64	75n.49	640.15ff.	159n.48
10.310-18	75n.49	641.23ff.	159n.49
<i>Pyrrhoniae hypotyposes</i>		641.27	160n.53
3.30-2	75n.49	642.14	160n.53, 162n.58
		642.14-18	159n.50
SIMPLICIUS		642.17-18	156
<i>In Aristotelis De anima</i>		642.21	162n.58
136.29 Hayduck	156n.39	644.10	160n.52, 161n.56

406 Theophrastus

801.13ff.	163n.62	STRABO	
1236.1	129n.66	<i>Geographica</i>	
		3.1.5	117n.5
SOPHOCLES		4.1.6	377
fr.710 Radt	22n.6	12.3.6	376
		12.3.8	376
SOSIPATER		12.3.10	376
fr.1.15 Kock	314	12.3.42	366, 381
STOBAEUS		STRATO	
<i>Eclogae Physicae</i>		fr. 73 Wehrli	275
1.4.7c	122	fr. 90	102n.147
1.5.15	122		
1.6.17c	124	SUDA	
1.18.1c	122	s.v. <i>kestrinos</i> (vol.3 p.103.22	
1.23.2	122	Adler)	379
1.24.4	122		
1.25	112-40	TAURUS	
1.25.1	112-14	ap. Philoponum, <i>Adv. Proclum</i>	
1.25.1-3	138	6.8	64n.9, 110
1.25.1e, 3a, 3h	120n.32	13.15	127n.56
1.25.3	118		
1.26.3	115, 123	THEMISTIUS	
1.27ff.	306	<i>In Aristotelis De anima</i>	
1.29	303	107.31-108.1 Heinze	33, 35
1.29.2	273-5	108.1-6	33, 38
1.31.4	123, 128n.62	108.9-10	15n.60
1.31.7	298	108.22-8	33, 41
1.31.8	277-8		
1.38.9	123	THEOCRITUS	
1.43	123	<i>Idyllia</i>	
1.207	115n.5	13.25	315
STOICORUM VETERUM		THEODORET	
FRAGMENTA		<i>Curatio affectionum Graecarum</i>	
2.35	84	4.14	120n.34
2.542	90n.108	4.21	132f., 138
2.701	298		
2.703-5	302	THEON	
3.268-9	83n.80	<i>Progymnasmata</i>	
		2 69.1ff. Spengel	109n.165
		2 120.15	71n.33, 80n.69, 88n.95, 91n.116

2 121.6-12	80	fr. 11	69n.9, 109n.166, 110, 117, 117n.16
2 121.7-8	80n.70, 91n.116	fr. 16	114f., 139
THEOPHRASTUS		fr. 18	100n.142
<i>De causis plantarum</i>		fr. 19	115
1.1.1	111	fr. 21	127n.56
1.13.1, 3, 4	317	fr. 22	100
2.17.5	57	<i>De pietate</i>	
2.19.4	315	fr. 3 et 7	280
5.13.7	277, 278	<i>De piscibus</i>	
<i>Historia plantarum</i>		1	349n.11, 353, 353n.19, 368, 379
1.1.3-4	52	1-3	358, 382
4.3.5	56	1-6	347, 353
6.8.1	373	2	370, 379, 381
7.13.6	336n.38	3	349n.11, 353-4, 371
9.8.2	318n.14	3-4	354
9.20.3	317	4	348n.4, 352n.18, 354, 372, 377, 382
<i>De igne</i>		4-6	359
1	273-4, 281, 284, 286-7, 295, 303	5	354, 372-3, 376-7
2	304	6	348n.4 & 6, 355n.26, 373, 375-6
3	274	7	348n.8, 349n.10, 356, 357, 359, 376, 379, 381
4-7	127f., 128n.158	7-11	347
9	273	7-12	353
10	358n.34	8	356-7, 377, 380-1
<i>De lassitudine</i>	111	8-9	359
<i>Metaphysica</i>		9	348n.5, 356, 357n.31, 378-81
8	314	10	347, 349n.9, 354, 356n.29, 377, 379-82
15	32n.1	11	348n.11, 356-7, 359, 380, 381-2
17	32n.1	12	347, 356-7, 381
27	314	<i>De sensibus</i>	
33	280, 290	1-58	29
34	32n.1	1-2	9-10
<i>Meteorologica</i>		2	13
versiones Syriacae et Arabicae	166-293	3	30
<i>De odoribus</i>			
70	349		
<i>Physicorum opiniones</i>			
fr. 2	110		
fr. 5 ^a	117n.16		
fr. 6	65n.10		

408 Theophrastus

3-4	30, 30n.25 & 26	<i>De ventis</i>	
4	15, 26	1	111, 224n.97, 272, 286, 304
5-6	30	1-4	224, 278-9
6	10, 13n.49	5	224n.97, 276, 321
7	20, 24-5	6	224, 278-9
8	10	9	279
9	29	15	128
9-10	28	16	128n.59
10	11n.40, 27, 28n.20	17	316, 323
12-20	16, 26-9	22	275, 279
19	13n.49, 27	35	310n.4
25	9n.32, 11n.40, 28n.21,	46	310n.4
	30, 60	48	314
25-6	11n.40	53-4	279
26	24n.13, 25n.15	55	315
27	10	58	312
27-37	10n.34, 30		
28	10, 11n.40	[THEOPHRASTUS]	
29	15n.61	<i>De signis tempestatum</i>	
31	10, 15n.57, 16, 31n.28	1-9	325
32	60	1	307, 313-14, 334
33	16	2	307, 314-320
35	17	3	307, 320-1
36	14, 25	4	307, 308, 314, 321-2, 336
37	14	5	307, 322-3
38	11n.40, 14	6-9	307, 311, 320, 323-4
39	30	10	331, 331n.33
49	9n.32, 10, 11n.39, 30	10-13	326
52	13n.49	10-25	307
53	16	11	308, 326, 331n.30
57	14, 15n.59	12	330
58	12n.46	13	326, 326n.30, 328,
58ff.	11		334, 336
59	11n.40	13-14	334
60-81	11	14	328-9, 331
70	15	15	328, 332, 334
72	14, 18n.71	15-19	326-7, 334
81	13n.49	16	335n.36
82	13n.49, 15n.59, 17	17	329
82-91	11	18	328, 329
87	17	19	329, 335n.36
		20	311, 321, 336n.39

- 20-2 327
 21 331, 335n.36
 22 321, 329-30, 336
 23 311, 314, 334, 335n.36
 24 321, 329, 334
 25 329-30, 334
 26-37 307
 26-7 327
 27 330
 28 329
 28-9 327, 334-5
 29 326, 330-1, 335, 336n.39
 30 311-12, 331
 31 335-6
 31-3 327
 31-4 335
 32 331, 335
 33 331
 34 309, 331-2, 336
 35 336n.39
 35-7 307, 311, 331, 335
 36 336n.39
 37 328, 334
 38 330
 38-42 327, 334
 38-49 307
 39 332
 40 327, 332
 41 332, 335
 42 329, 334
 43 321, 327, 336
 44 317
 45 312, 321, 326, 333
 46 310, 331, 334, 336
 47 321, 334
 49 326, 333-4
 50-1 327
 50-4 307
 51 312, 331
 51-2 327
 52 327, 335
- 52-3 327, 334
 53 334
 54 333
 55 308, 326, 336n.38
 55-7 307-8, 335
 56 308, 330, 333
 57 308
 58 309
- THEOPHYLACTUS SIMOCATTA**
Quaestiones naturales
 1.9 375
- THOMAS CANTIMPRATENSIS**
De rerum natura
 7.36 (p.262.24-8 Boese) 364, 377
- THUCYDIDES**
Historiae
 4.83 325n.29
 4.117.1 318n.17
- TROPHONIUS**
Prolegomena
 1.2 70n.27
- VERGIL**
Aeneis
 9.588 303
- MARIUS VICTORINUS**
In Rhetoricam M. Tullii Ciceronis
 176.9ff. 79n.61, 106n.155
 235.27ff. 106n.155
 270.4ff. 106n.155
- VITRUVIUS**
De architectura
 8.2-4 275-6
 8.2.3 294

410 Theophrastus

XENOPHANES		21B30	120n.35, 128
21A32 DK	137n.81	21B32	126n.52
21A36	136n.80		
21A38	137n.81	ZĀHIR AD-DĪN AL-BAYHAQĪ	
21A40	116, 137n.81	<i>Taʾrīkh ḥukamāʾ al-Islām</i>	
21A46	321	26f.	220n.64